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INTEGRATED CUSTOMER INTERFACE FOR WEB BASED COMMUNICATIONS NETWORK  
MANAGEMENT  
INTERFACE CLIENT INTEGREE POUR LA GESTION DE RESEAUX DE COMMUNICATIONS  
BASES SUR LE WEB

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INTEGRATED CUSTOMER INTERFACE FOR WEB BASED COMMUNICATIONS NETWORK  
MANAGEMENT

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## Detailed Description Claims

### English Abstract

A web-based, integrated customer interface system (30) for enabling customer management of their communication network assets. A web-based GUI (20) enables a customer to interact with one or more **network management** resources and telecommunication services. The integrated interface system (30) includes: 1) a customer's **network report management**; 2) a centralized in-box system for online notifications to client workstation; 3) a real-time network services monitoring system; 4) broadband system for presenting physical and logical views of data networks and performance information; 5) a toll-free **network management** system enabling customization of 800/8xx toll free number routing; 6) Outbound **Network Management** (ONM); 7) packet-switched events monitoring; 8) a trouble ticket tool; 9) web-based **invoice** reporting for access to billing information; 10) web-based call manager; 11) on-line order entry and administrative service; 12) system for handling security and...

### French Abstract

...Web, qui est concu pour permettre a des clients de gerer leurs avoirs sur des reseaux de communication. A cet effet, une interface utilisateur graphique ( GUI ) (20) basee sur le Web permet a un client d'interagir avec une ou plusieurs ressources de gestion de reseau et avec un ou plusieurs...

## Detailed Description

### INTEGRATED CUSTOMER INTERFACE FOR WEB BASED COMMUNICATIONS NETWORK MANAGEMENT

The present invention relates generally to information delivery systems over the public Internet, and, particularly, to a WWW/Internet-based, telecommunications data management service for...

...deployed an MCI ServiceView ("MSV") platform comprising a number of independent legacy systems enabling dial-up connectivity for those customers desiring to obtain the following **network management** service and reporting data pertaining to their telecommunications networks: priced call detail data and reporting; toll-free network manager "800NM" call routing data; outbound **network management** data; trouble ticket information; fault SUBSTITUTE SHEET (RULE 26) manager alarms. Limited interactive toll free network control is additionally supported whereby customers may change the...for providing reports on the performance of customers' Broadband (data) networks.

More particularly, MCI's ServiceView platform ("MSV") provides for the generation of Toll-free **Network Management** data, priced call detail ("Perspective") data for usage analysis and trending, each of which requires a different reporting mechanism due to the nature of the...

...is needed is a comprehensive system that facilitates and simplifies customer access to, and management of, all of their telecommunications network assets and enterprise

telecommunications **network management** products and services to which they have subscribed.

-3 SUBSTITUTE SHEET (RULE 26) The rapid adoption and use of the internet for data exchange has...measure of platform independence for the customer.

Furthermore, it would be desirable to provide an Intranet/Internet/Web-based reporting system that provides a common **GUI** enabling both report requesting, customizing, scheduling and viewing of various types of data from different back-end telecommunications service and applications.

It would also be...

...providing telecommunications products and services data to customer's over the Intranet.

It is therefore desired to provide connectivity to enterprise legacy systems providing telecommunications **network management** services over the public Internet, as the Internet provides access connectivity world wide via the TCP/IP protocol, without need to navigate various telephone exchanges, dialing standards or signal standards.

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The present invention is directed to a Web based, integrated customer interface system for telecommunications **network management**. The customer interface system is provided with a graphical user interface for enabling a user to interact with one or more telecommunications **network management** services provided by remote servers located, in a telecommunications service provider's Intranet, and utilizes a Web paradigm to allow easy and convenient access to...

...call detail statistics and call detail data pertaining to their special service network usage, e.g., 800/8xx toll-free networks; 4) a toll-free **network management** system enabling customers to define their own 800/8xx toll free number routing plans via the Web/Internet, enabling customers to change and modify their...

...change the percent allocation of traffic for a particular 800/8xx toll free number based on SUBSTITUTE SHEET (RULE 26) certain criteria; 5) an outbound **network management** system enabling customers to manage and track features and services associated with their virtual networks ("Vnet") including management of calling party number orders, dialing plan...logical performance information relating to the circuits which comprise a customer's Broadband data network, e.g., frame-relay, thus, allowing customers to make informed **network management** decisions in controlling their **business** telecommunications networks; 7) a trouble ticket tool enabling a customer to open and monitor trouble tickets relating to network events on an enterprise network; 8) a Web-based **invoice** reporting system allowing the customers access to their billing and **invoice** reports associated with network services provided to a customer; 9) a web-based call manager service enabling call center customers to control delivery of toll...

...with the backplane unit.

Thus, in accordance with the principles of the invention, there is provided an integrated system for providing a plurality of communications **network management** services and products to a customer over the public internet, the **network management** services and SUBSTITUTE SHEET (RULE 26) products accessible from a client workstation employing a client browser associated with said customer and capable of receiving web ...

...entry into the system, each secure web server supporting secure communications with the client workstation; a plurality of client applications integrated within a web-based **GUI** and downloaded from a **secure** web server according to pre determined customer entitlements, each client application for providing a customer interface integrated within the web based **GUI** and enabling interactive communications with one or more communications **network management** resources provided by the communications service enterprise via a secure web server; and, each secure web server supporting communication of request messages entered by the customer via the customer interface to the one or more **network management** resources capable of providing a desired communications **network management** function, wherein one or more remote application resource processes the request messages and provides responses to the one or more secure web servers for secure...

...integrated customer interface, thereby enabling a customer to manage its communications network assets. ..

Advantageously, the integrated customer interface implementing an Internet delivered paradigm, for telecom **network management** services obviates many

-9 SUBSTITUTE SHEET (RULE 26) of the installation and configuration problems involved with initial setup and configuration of a dial-up customer...ONM system 200 of the invention; Figures 29(a)-29( p) illustrate various examples of ONM web page screen dialogs enabling user interaction with Outbound **Network management** system; Figure 30 is a detailed block diagram depicting the physical architecture of the Broadband reporting system component of the present invention; Figure 31 illustrates...

...displayed for providing the user with the ability to view, create, delete and edit ACD collectors; Figure 51 illustrates an architectural schematic of the online **invoicing** system 1300 component of nMCI Interact; Figure 52 is a flow diagram illustrating an online **invoicing** process flow; Figure 53(a) is a sample criteria screen launched from the nMCI Interact home page; Figure 53(b) is a sample screen displaying a list of **invoice** reports; Figure 54 is a sample screen displaying an **invoice** document generated by the online **invoicing** system component of the invention; Figure 55 is a flow diagram illustrating an online **invoicing** back-end server process flow 1400 during document indexing and storing; Figure 56 is a flow diagram illustrating an online **invoicing** back-end server process flow when responding to client requests for

document presentation; Figure 57 is a schematic illustration of the message format passed from...

...present invention's process flow during logon, entitlement request/response, heartbeat transmissions and logoff procedures; and Figure 59 is a data flow diagram for various **transactions** communicated in the nMCI Interact system; SUBSTITUTE SHEET (RULE 26) Figure 60 is a diagram depicting the physical network architecture of the nMCI Interact system...

...to the Dispatcher server.

The present invention is directed to a Web based, telecommunications network application delivery system for delivering an integrated suite of customer **network management** tools to customers of telecommunications service providers using a Web browser paradigm. The integrated suite of customer **network management** tools described herein and provided by the assignee of the present invention, is collectively referred to as the networkMCI Interact system ("nMCI Interact"). Such an...

...a customer work station 20 and provides customer access to the enterprise system, having one or more downloadable application objects 10 directed to front end **business** logic and application services, a backplane service layer 12 for managing sessions, one or more presentation services objects for the presentation of telecom **network management** options and customer requested telecommunications **network management** data in a browser recognizable format, and a customer supplied browser for presentation of customer options and data to the customer and for internet communications...workstation 20 is client software capable of providing a platform-independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and server interfaces for...

...the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, Service Inquiry, Toll Free **Network Management** ("TFNM") or Call Manager ("CM") functions. The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a...

...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects which provide the front end **business** logic and manages their launch.

As will be described, each of the nMCI Internet suite of **network management** applications implements a set of common objects (CO) that minimizes the replication of code, and provides a framework in which a family of internet applications...

...application management, and a model view controller (MVC) framework. The primary common object services for each of the suite of applications include: graphical user interface ( GUI ); application launch; window navigation among applications; inter-application communications; printing; user identity, session management, authentication, and entitlements; data import and export; logging and statistics; error... Figure 2, it is

understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 40(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and 40(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only

...one component of the nMCI

Interact system is the client-tier software component which provides the integrated and unified interface to each of the telecommunications **network management** services available to a user. As shown in Figure 3, the system of the present invention implements an "application backplane" 12, a single object which...backplane object 12. The home page 79(a) is downloaded after the authentication via a logon page and provides, for example, a suite 95 of **network management** reporting applications including: MCI Traffic Monitor application 85; an alarm monitor application 87; a Network Manager application 89 and the Service Inquiry application 91.

Access...backplane's deregisterAppo method.

Then a user typically requests logoff via menu, close box, etc. When such a request is received the backplane sends Logoff **transaction** to the Web Server. The backplane closes toolbar and directs the Web browser to logon URL. Then the backplane exits.

As further shown in Figure...their organization.

By utilizing the system of the present invention, customers no longer have to place manual calls to order entry hubs when requesting order **transactions** . For example, users may be added to the system without an enterprise's support team intervention. In sum, customers may manage their communications services in...

...platform having a Web browser, hereinafter referred to SUBSTITUTE SHEET (RULE 26) as a StarOE client application. The StarOE server 39 processes a number of **transaction** requests relating to authentication and entitlements, from other application services, both from the client and the application server 158 sides of the network. In addition, the StarOE server 39 receives **transaction** requests from the StarOE client application. The **transactions** are typically message driven and comprise requesting **transactions** and response **transactions** . The StarOE server 39 responds to the message requests by formulating **transaction**

responses and transmitting them to the requesting servers and clients.

The StarOE client application

The StarOE client application 154 is one of the client browser applications running in the web browser 14, and provides a Web-based **GUI** interface implemented accordingly and conforming to the networkMCI **Interact GUI** interface standard for the integrated suite of customer **network management** and report applications, as described herein. As described, the StarOE client application 154 is launched at the client initiation by the backplane object and generally includes Java applications and applets for providing a common Web-based **GUI** for interacting with customers at the front-end side.

When a customer launches the StarOE application from the home page, the main window as illustrated...that user. The main window 1500 having the menu options 1506 and the toolbar 1504 is then presented. The StarOE client application then sends a **transaction** message "get SUBSTITUTE SHEET (RULE 26) StarOE security" including the user id, enterprise id, and the StarOE application code in the message. The StarOE server...

...only one enterprise. For external administrators, an enterprise name is retrieved from the StarOE server 39 by sending and receiving a "get user enterprise list" **transaction** request and response.

If the user is not an external administrator, then a dialog is presented for the user to select which enterprise to view. When user selects an enterprise to view, a "get user list" **transaction** message having enterprise id is sent to the StarOE server 39 to retrieve a list of user ids, a list of applications for each user...

...type for each application, and reporting types for StarWRS (e.g., Toll Free, Vnet, Vision, CVNS). The client application also sends a "get application list" **transaction** message to retrieve from the StarOE server 39 a list of application codes, description, and an application array position. The user list is then displayed...that besides performing various order entry and administrative functions for the TFNM application, other application services, including reporting for VNET, Vision, Broadband, Call Manager, and **invoice** reporting may be ordered and the security information pertaining to each application may be modified in a similar manner.

StarOE client application 154 particularly provides...StarOE client application 154 executed at the customer workstation 20.

Referring to Figure 7, a process running in a StarOE client application process 154 sends **transaction** SUBSTITUTE SHEET (RULE 26) request messages via the nMCI **Interact** infrastructure, comprising, e.g., the web server cluster 24 and a dispatcher server 26 (Figure 2), to the OE server 39.

The StarOE server 39 responds to requests by searching the security profile for the information requested, formulating appropriate **transaction** response messages and transmitting them back to the

requesting process.

As an example, other during the login procedure, the client login process formulates a **transaction** message including a user name/password and a validation request for a given customer. The StarOE server 39 looks for the matching name/password pair...

...for a given customer is stored in customer profile database 160 located with the StarOE server. When the backplane requests via TCP/IP the entitlement **transaction**, for example, in a "get application list" request message, the security module retrieves and transmits back via TCP/IP to the backplane the list of authorized applications accessible by a given customer in a **transaction** response. The backplane uses the list to determine which buttons on the "networkMCI Interact" home page should be activated, thus controlling access to products. Similarly...will now be described in detail, the StarWRS reporting system 200 comprises the following components and messaging interfaces:

1) those components associated with the Client **GUI** application front end including a report requestor client application 212, a report viewer client application 215 and, an Inbox client application 210 which implement the...

...metadata used for displaying reports. In the preferred embodiment, the RM server 250 employs a Unix daemon that passively listens for connect requests from the **GUI** client applications and other back-end servers and deploys the TCP/IP protocol to receive and route requests and their responses. Particularly, Unix stream sockets services requests that arrive from the **GUI** front-end. If the errors are found in the metadata input, the RM 250 will return an error message to the requesting client. If the...

...back-end and legacy servers including, e.g., Event Monitor and Service Inquiry servers, etc., in order to present to a customer these types of **network management** and reporting data.

The report manager server additionally utilizes a database 258, such as provided by Informix, to provide accounting of metadata and user report...Report Requestor client application it needs to get information (e.g., Pick Lists) from the StarOE server 39.

With regard to the front-end client **GUI** components, the above-mentioned Inbox client application 210 functions as an interface between the client software and the Inbox server 270 for presenting to the...is provided to enable customers to manage their inventory, e.g., reschedule, change, or cancel (delete) report requests.

The Report Viewer application 215 is a **GUI** Applet enabling a user to analyze and display the data and reports supplied from the fulfilling servers such as ODS 400, Traffic View (TVS) 500 by executing a **GUI** applet that is used for the display and graphing of report data and particularly, is provided with spreadsheet management functionality that defines what operations can...

...messages telling it to display an image or text that may be passed by one of the applications in lieu of report data (e.g., **Invoice** , Broadband report, etc.) By associating each set of report data which is downloaded via the Inbox server 270 with a "metadata" report description object, reports...From this screen and related report building dialog boxes, all of the SUBSTITUTE SHEET (RULE 26) initial values for retrieving the MetaData, customization options and **GUI** builder options from the report manager server 250 necessary to build (edit) a report are provided in accordance with the user's entitlements. Thus, in... SUBSTITUTE SHEET (RULE 26) user with the following selectable access types: dial 1, card, dedicated, 800 Remote Access, Direct Dial fax, store/forward fax, 800 **Business** line (highlighted in ...server may communicate to the inbox server 270 by making requests to the inbox proxy 2701. The proxy, generally waits for a request from an **application** and then services the request.

#### SUBSTITUTE SHEET (RULE 26)

The inbox proxy's main responsibility is to process requests by either handling them internally within...

...the system, the inbox proxy 270, uses the application program interfaces (APIs) provided by the unetworkMCI Interact" supporting different types of data transport mechanisms: synchronous **transaction** ; asynchronous **transaction** ; and, synchronous bulk transfer. The transport mechanisms are implemented as sockets message protocol, and the proxy handles its conversation processing on a thread or process...data translations, data grouping, data routing, and data logging functions. According to a dimension table based on data within selected BDRs, the harvesting process applies **business** rules to the data, cleanses the data, transforms the data, creates load files for DataMarts and compresses files for storage in the DataMarts. The harvesting...450 includes a Decision Support Server ("DSS") reporting engine component 475 that performs the following functions: 1) receives various customer report requests from the StarWRS **GUI** Report Requestor component and accordingly generates database queries; 2) routes the query to the appropriate data marts 470, data warehouse or operational data store; and, 3) responds to the requestor with a formatted result set. The DSS server 475 may also perform cost estimation, agent scheduling, workflow broadcasting interface, and **transaction** logging functions. In the preferred embodiment, the SUBSTITUTE SHEET (RULE 26) DSS 475 is a cluster of DEC (Digital Equipment Corp.) UNIX 8400 servers running...the customer via the StarWRS Web Reporting System, and, supplies on-line customer access to call detail and hourly statistics that aid the customer in **Network management** , call center **management** and customer calling pattern analysis. For real time (unpriced) data, statistics are generated ...via an RTM graphic user interface and preferably communicated over secure TCP/IP socket connections for input over the firewall 25 to at least one **secure server** , e.g., a DMZ RTM Web Server 52 (Figure 2) that provides for

-112 SUBSTITUTE SHEET (RULE 26) authentication, validation, and session management in the...blocked, etc. It is from this screen that a customer

may view real-time information pertaining to their toll-free network usage, and make informed **business** decisions regarding call-routing plans.

-115 SUBSTITUTE SHEET (RULE 26) As further shown in Figure 23(e), the customer may select a start time button...handled.

#### Service Inquiry

Another application of the suite of telecommunications network applications is the networkMCI Interact Service Inquiry ("SI") application which is a web-based **network management** product that enables customers to manage, i.e., create, status, and

-121 SUBSTITUTE SHEET (RULE 26) display service requests ("trouble tickets"), to the enterprise service provider (MCI). Particularly, through a client application **GUI**, customers have the ability to create and query trouble tickets ("tickets") .

Figure 2 illustrates the service inquiry "SI" application server 36 interfacing with a backend...with the other elements of the networkMCI Interact architecture.

The Common Objects framework is utilized to leverage existing infrastructure services such as logon and authentication, **transaction** management, and security.

Particularly, the Service Inquiry application extends the COAppImpl class in order to inter-operate with the Interact back plane and other networkMCI...

...one or more screens derived from the COAppFrame class. Most of the high level classes dealing with the initiation of

-122 SUBSTITUTE SHEET (RULE 26) **transactions** are utilized by Service Inquiry. The COClientSession class is available to the Service Inquiry application upon successful login to the networkMCI Interact system and is...

...response from the backend service is then received by the application server and returned to the originating client. The framework enables customers to develop the **business** logic independent of the underlying transport layer and negate the need to modify the transport layer whenever a new domain model is introduced into the framework. The separation of the framework from the domain is accomplished through the use of reflection by dynamically loading and executing the **business** logic at the application server once the client request specification is received.

As described herein, the SI application server 2300 interfaces with the Legacy Backend...

...SvcInqCSMRequester object 2310 is the class that represents the requester which takes the request data that comes from the

Front-End/Client application through the **Transaction Manager** 2320, builds the CSM/SI

-124 SUBSTITUTE SHEET (RULE 26) request **transactions** by interacting with the Translator classes 2380 and ships off the requests to CSM. The request data that comes from the Front End/Client is...  
...SvcInqRegistryHeader and SvcInqSIHeader classes in the Translator 2380 to build the "Registry Header" and "SI Header" strings that are required for the CSM/SI request **transactions**. It also talks to the SvcInqActivity or the SvcInqRemarks classes to build the data portion of the CSM/SI requests. Once the CSM/SI **Transaction** String is formatted the actual request to CSM is made. Sending the **transaction** to CSM's Standard Interface (SI) via Registry classes does this.

The receiver object is an instance of the SIRegistryHandler class whose responsibility is to...

...activity, detail or list of Ticket object from the response string that is received from CSM.

The built object is then sent back to the **Transaction**

-125 SUBSTITUTE SHEET (RULE 26) Manager 2380 who passes it back to the Front-End/Client.

Figure 25(b) illustrates a flow diagram depicting the execution of a **transaction** by the SI application server 36 with each bubble representing a separate thread. First, at step 2501, the SI Application Server 36 instantiates and starts the **Transaction Manager** 2500 in a separate thread. The SI Application Server then instantiates and starts the **Transaction Server** 2500 in a separate thread at step 2502. The SI Application Server 36 instantiates and starts the Registry Server in a separate thread at step 2503.

More particularly, as shown in Figure 7(a), the **Transaction Server** receives a client **transaction** request, as shown at step 2504. The connection is accepted and **Transaction** Handler thread is removed from the thread pool for execution, as indicated at 2505.

The **Transaction** Handler unpackages the **transaction** request at step 2506 and puts the request message into the **Transaction Manager**'s RequestQ. The **Transaction Manager** 2600 removes the request message from its RequestQ at step 2507 and spawns a **Transaction Executer** thread to execute the **transaction**. Then, at step 2508, the **Transaction Executer** translates the message and executes the **transaction** by loading the domain class and invoking the specified method which send the request to the backend services.

As indicated at step 2509, the backend service responds by sending the result of the **transaction** to the Registry Server which accepts the connection. At step 2510, a Registry Handler is removed from the thread pool for execution for performing translation of

-126 SUBSTITUTE SHEET (RULE 26) the received message and placing the result into the **Transaction** Manager's ResponseQ, as indicated at step 2511. The **Transaction** Handler retrieves the **transaction** result from the ResponseQ at step 2512 and the **transaction** response is delivered to the client at step 2513.

The mainframe legacy backend 40(a) "Registry" is the cross-platform communication mechanism that is used...

...messages from the CSM host. It shields applications from network protocols. CSM is provided with a mainframe database (not shown) that provides a set of **Transactions** to request CSM information through its Standard Interface (SI) which uses Registry as the messaging system. The Service Inquiry Application Server 2300 is configured to...button 2461e; or, remove all parameters in the table by selecting the "Remove All" button 2461f.

As an example, a "List Tickets by Status Request" **transaction** will provide all the tickets for a given organization (ORG) code with the requested status and created after a specified date. The ORG code to be passed in this **transaction** is one of the selection criteria representing the originating organization or the organization where the ticket was created. The customer may choose from a list...

...then he/she has implied access to all the subordinate organizations meaning that the request will apply to the subordinate organizations as well. Furthermore, this **transaction** may only display some of the SUBSTITUTE SHEET (RULE 26) details/fields of the tickets which means that the data cached from this request may...

...be used to process the Queries on tickets. It cannot be used to view all the details of the tickets for which further CSM/SI **transactions** will have to be made as will be herein described.

Once the query is specified and executed, the "Query Results" window such as provided in...the query results and select "View/Details" from the menu bar or double click the ticket in the query results.

Particularly, a "Display Ticket Request **Transaction** " (CSM/SI **transaction** ) may be used to obtain the details, activities and remarks of a ticket. This **transaction** allows several display requests to be made, e.g., by setting corresponding flags to 1Y1. Whenever the customer wishes to view details, remarks or activities...and the ticket number stuck

-133 SUBSTITUTE SHEET (RULE 26) into the SI header which will generate three or more responses. The "Display Detail Response **Transaction** " is a response that returns all the data elements corresponding to a given ticket in a "Details" window such as the example window 2490 shown...

...types of tickets.

Alternately, to find a ticket, e.g., upon selection of the "Find" button

2453 from the tool bar 2450, the CSM/SI **Transaction** , "Display Ticket Request **Transaction** " is invoked, where the ticket number is passed on the request for handling as described above.

It should be understood that, in the preferred embodiment, a "Change Ticket Request **Transaction** " may be implemented allowing the customer to change some of

--he fields of a ticket that is already created. This restriction is enforced by the **GUI** as this CSM/SI ~ransaction does not impose any such conditions on the field being modified.

Remarks are comments added to a ticket for historical...

...in the resolution of ,--he problem. A customer must be viewing the particular ticket's details that contain the remarks desired. The "Display Remarks Response **Transaction** " is a response that shows all the comments added on the ticket either by the customer or by the enterprise

-134 SUBSTITUTE SHEET (RULE 26...

...display of the "Add Remarks" window (not shown) which allows the customer to add remarks to that Ticket.

Thus, by implementing an "Add Remarks Request **Transaction** , " the customer may add remarks on a ticket that is in an open status at any time. This may be used as a final step, just after creating a ticket, for example, to enable the customer to describe the trouble in his/her own words or add any comments. This **transaction** returns a success or failure response.

Activities are events that occur to a ticket throughout its lifecycle. These events include changing status, changing priority, and...

...of the person working the ticket. The customer must be viewing the particular ticket's details that contain the activities desired. The "Display Activity Response **Transaction** " is a response ...shown in the example screen display of Figure 25(k). From the activities window, the activities for that ticket are displayed.

This is a useful **transaction** in checking the status of a ticket and, it aids in tracking a ticket as it shows which organization the ticket is currently in.

The...

...the Event-Type/Call-Type of the problem which is basically the way CSM handles different problem types and is required for most CSM/SI **transactions** . To do that the client front end asks the customer the problem/identifier type and then narrow down the problem by having the customer choose...

...fields is then gathered from the customer by presenting appropriate

questions. once all the required information is available, the system performs an "Open Ticket Request **Transaction**" and passes all of the data fields. The CSM legacy system then attempts to open a Trouble Ticket based on the data passed, and performs an "Open Ticket Response

-136 SUBSTITUTE SHEET (RULE 26) **Transaction**" to indicate if the ticket was created successfully along with the ticket number. Based on this response a confirmation message along with the ticket number...ticket out to an organization obtained from the user up front and stored in the User Profile. This is done using an "Enter Activity Request **Transaction**" which allows the customer to enter different activities like 'Refer Out', 'Close', 'Refer Back' and 'Open' on a ticket by passing the appropriate activity code.

-137 SUBSTITUTE SHEET (RULE 26) Finally, the SI application allows the customer to close the ticket by using an "Enter Activity Request **Transaction**" described with respect to ticket creation.

When a customer wishes to close a ticket, the system will make this **transaction** on behalf of the customer by passing the activity code for 'Close'. A customer is allowed to close a ticket only if it were created ...  
...satisfied with the problem resolution, that customer may refer the ticket back to the enterprise (MCI).

This is also accomplished using the Enter Activity Request **Transaction**. Again, the system will make this **transaction** and pass the activity code for 'Refer Back'.

The creation of trouble tickets through Service Inquiry will now be described in greater detail in view...

...with the client presentation layer and interaction with the back-end systems. Information that is gathered via the presentation layer is used to construct backend **transactions**. The information returned from these backend **transactions** is formatted to DOM classes, which are forwarded to the presentation layer.

As shown in Figure 25(m), the TroubleTicket 2610 is the root of...child Question is included in the group; otherwise, it is excluded from the group.

#### TFNM

As mentioned above, another application of the suite of telecommunications **network management** applications is the toll free **network management** tool

-142 SUBSTITUTE SHEET (RULE 26) 800 as shown in Figure 26. Referred to herein as "TFNM," the toll free **network management** tool 200 provides the client **GUI** and middle-tier service that enable customers to request, specify, receive and view data pertaining to their toll free **network management** assets, e.g., toll free number routing plans, and to generate orders for changing aspects of the routing plans via a World

Wide Web interface...protocol for providing secure, client-to-server communication with Java RMI-like semantics and comprises a library of Java classes used by both the client **applet** and **server application**. In view of Figure 26, the communication path from the client and the **server** is as follows:

The TFNM server application 840 registers remote objects with CORMI's CORemoteSessionServer (analogous to Java RMI's Registry service) and then blocks waiting for connections. The TFNM client **applet** initiates communication by performing a logon through a COClientSession object. The COClientSession creates a COSynchTransaction (an atomic unit of work based over an HTTPS socket) which connects to the MCI Interact system dispatcher **server** 835 (which is behind the outer firewall 25(b)) and interfacing with StarOE **server** 39.

The dispatcher server 26 validates the client's authorization to logon (a process that involves

-145 SUBSTITUTE SHEET (RULE 26) contacting the StarOE service...attached to the selected Time interval node equals 100 percent. Action keys 1695a-1695d may additionally be enabled for user selection in accordance with enterprise **business** rules and/or user security.

Specifically, key 1695a enables the submission of the QUIK/TEMP QUIK order to NetCap for approval (Issue key). Key 1695b...TFNM server for processing as described herein.

Referring back to Figure 26, the customer's Send QUIK request 824 is communicated by the TFNM client **applet** by communication between the Dispatcher **server** 235 and the TFNM **server** objects using CORMI. The,

-162 SUBSTITUTE SHEET (RULE 26) object manager/sub-classes execute methods for translating the QUIK/TEMP QUIK order in a form...tool additionally may provide

-165 SUBSTITUTE SHEET (RULE 26) "drag and drop" enabling users to configure routing elements between plans.

Although the TFNM web/Internet **network management** tool has been described herein with respect to a customer's toll-free, e.g., 1-800/8xx networks, the principles may be readily applied...

...Another application of the suite of telecommunications network applications is the networkMCI Interact Outbound Network Manager application 2700. Referred to herein as "ONM," the outbound **network management** tool 2700 provides the client GUI and middle-tier service that enable customers to manage and track Calling Party Number Orders, Calling Card Orders, Dialing Plan Orders, and ID Code get...

...entry system 290, Service Control Manager 290a ("SCM") and Data Access Points 290b ("DAP"). The ONM server 2750 enables customers to change their Vnet/Vision **network management** plans, both in real-time and on a scheduled basis, via nMCI Interact's web-based front-end and

middle-tier infrastructure.

-166 SUBSTITUTE SHEET...

...directives are preferably communicated as Java applets over secure HTTPS socket connections 2722, 2724 for input over the firewall 25(a) to at least one **secure server**, e.g., a DMZ Web server 24 that provides for authentication, validation, and session management in the manner as herein described. After validation and authentication...a new one, the nMCI Interact ONM system Dialing Plan Order option allows a company to define their call routing Dialing Plans to meet their **business** needs and manage their network costs. Thus, the nMCI Interact Outbound NM Dialing Plan order enables a

-186 SUBSTITUTE SHEET (RULE 26) customer to: 1...and retrieval in the manner as described herein.

#### EVENT MONITOR

-201 SUBSTITUTE SHEET (RULE 26) As mentioned above, another application of the suite of telecommunications **network management** applications is the event monitor and Broadband network performance reporting system 850. As shown in the high level process flow diagram of Figure 30 customers and alarm monitoring functions. All interactions with the Broadband reporting and system **network management** platform ("SNMP") features occur between the Broadband client **applet** 852 and a Broadband **server** 860. Particularly, Broadband application's Java classes invoke a "message class" that has the Common Object code as an interface definition.

Integrated within the Broadband...Web Server 860 functioning as a client to receive authentication information and Bill ID and Level of service information which are supplied in response to **launch** of the Broadband **applet**.

To establish Basic level reporting, the Broadband Server 860 transmits new customer information to the PRSI component 880 when it is received. The customer Bill...over time, and then to determine whether the network should be changed to ensure that it is operating at maximum performance levels (i.e., meeting **business** needs). The Broadband reporting system thus enables customers to review network performance data over a period of time, e.g., up to 45 days, by...the preferred embodiment, a Broadband Main Display applet is provided as a launching pad for accessing all of the aforementioned Broadband services.

The Main Display **applet** is preferably a **Java applet** running inside the user web browser 20 and utilizing classes which extend the basic Java **applet** functionality in areas such as application management, user session management, user-interface, inter- **applet** communication, and client/ **server** communications.

Particularly, from the Broadband Main Display applet access to and communications between Broadband applications is provided using the Common Object COApplet, COApp, and COBackPlane...

...the corresponding application. When the user exits from Broadband services, the COBackPlane is utilized to destroy the application and its windows.

The Broadband Main Display **applet** provides a menu bar, toolbar, and status bar for accessing Broadband services according to the customer's subscribed service option which includes: Basic; Standard; Enhanced SNMP; Premium; Enhanced Ad hoc Reporting; Enhanced SNMP + Ad hoc Reporting; and Dedicated SNMP. As determined by the user logon session with the StarOE **server** 260, if the user is not entitled or does not have authorization for a particular service, the corresponding toolbar icon or menu item is disabled...submits the custom report request it is forwarded to the Broadband Inbox for subsequent view.

When basic service option is provided, the Broadband main display **applet** has the responsibility of: 1) requesting service type (entitlements) either from StarOE authentication **server** or as data from BackPlane (Figure 3); 2) requesting reports that are no longer on the Inbox **server** to be retrieved from a

-214 SUBSTITUTE SHEET (RULE 26) report data archive if a pre-determined period of time has elapsed, e.g., 45...as indicated at step 972; and, map reports, as indicated at step 973.

Thus, in the preferred embodiment, the Broadband Report Viewer component includes Java **applet** viewer classes that enable the downloading and display of performance reports generated from the Broadband **server** 860. In the preferred embodiment, there are at least two types of viewer classes providing the following reports: 1) Monthly Network Health Reports which are...

...in addition to a fourth reporting Exceptions view. Besides having the ability to select reports on a daily or monthly basis, a custom reporting Java **applet** is provided to enable customers to select Broadband "ad hoc" (one time) reports at any previously defined interval. For example, a customer may have a...

...an ad hoc "Throughput Performance" report for a previous time interval, e.g., previous week, or previous month. In the preferred embodiment, the Broadband web **server** adds completed report data in CSV to the Broadband Inbox **server** 270 which component enables the client reporting viewing process 215 to display reports. Particularly, the BB client application loads the report viewer, which loads the...further detail. Besides having the ability to generate network performance reports and configuration maps, the Report Viewer component of the Broadband Reporting tool includes Java **applet** classes enabling the presentation of real- or near real- time alarm and network event data obtained from the **network management** platform, "NetExpert" 870 as shown as Figure 31. Via a proxy application 871, events and alarm notifications are sent to the BB **server** 860 which processes the alarms for communication through the dispatcher/BBProxyServer applications directly to the BB client 852, via secure TCP/IP socket messaging, as...Thus, a click on any identified point provides greater detail about the circuits supported from that end

point including: circuit location; Circuit number; Gateway mnemonic; **Network Management** ID; Bandwidth; # PVC; and, CIR Total. As shown in Figure 35(b), lines connecting PVC end points are also drawn by a mouse click on...clears an alarm and removes it from the database.

It should be understood that all Network Detected Alarms are event-based and discovered by SNMP **Network Management** tool. User Defined Alarms include "Ad-Hoc Threshold" alarms which are generated in instances where a customer set value in a custom report is exceeded...

...enabled to: Get SNMP statistics and Set SNMP name.

Particularly, the process flow for providing SNMP Get/Set capabilities begins by invocation of an SNMP **applet** which is sent to the client workstation by the BB **Server** application. By selecting the SNMP Get/Set button 1732 (Figure 34(a)) from the main display causes the creation of a SNMPGetSetApp (COApp) object to...submit new requests to set SNMP variables from other circuits, or, may end the session.

-227 SUBSTITUTE SHEET (RULE 26) The nMCI Interact suite of **network management** applications further includes an event monitor tool 1000 for enabling customers to monitor, over the Internet or a company Intranet, their dedicated voice and data...

...on degraded or broken circuits and provides network performance and alarm information, thereby effectively increasing the efficiency of troubleshooting and allowing customers to make informed **network management** decisions. It should be understood that the event monitor tool may be integrated w.-Lth the Broadband network reporting service to provide a comprehensive data...

...SUBSTITUTE SHEET (RULE 26) system 1000 is integrated within the nMCI Interact system comprising: the user web browser 14 whi ch employs an event monitor **GUI** 1030 enabling the generation of requests and receipt of responses from various event monitor system server processes 1050 over the Web/Internet via a secure...server 1050 functioning as a client to receive authentication information including logon user identifiers which are supplied in response to launch of the event monitor **GUI applet** 1030. The billing identifiers and levels of services, including the specific entitlement information are supplied from StarOE 39 to the event monitor **server** 1050 via flat files which may be generated daily.

From the back-end legacy host, the event monitor server 1050 receives statistics on voice (DAL...customers may then view alarms and take necessary steps to correct the problem.

The performance parameters and thresholds may be modifiable via the event monitor **GUI** applet 1030 by those customers having proper access level entitlements as verified by the StarOE 39. Each of the components shown in Figure 36 and their respective processes will be described in further detail herein.

Event monitor **GUI** client application

All alarms and reports for event monitor are accessible via the

finetworkMCI Interact" alarming and reporting structure established within the nMC1

-233 SUBSTITUTE...

...page 79. Event monitor alarms are viewed via an alarm monitoring system in which both broadband and event monitor alarms may appear. The event monitor **GUI** client application is launched via the event monitor icon 87 on the home page (Figure 5(a)).

Reports for fault reporting may be requested through the report requestor component of StarWRS, and the inbox server.

In the preferred embodiment, the event monitor **GUI** client application 1030 is launched by selecting the event monitor icon 87 from the "networkMCI Interact" home page (Figure 5(a)). The event monitor **GUI** client application provides a menu bar, toolbar, and status bar for accessing event monitor services depending on the customer's service subscriptions. Event monitor service...

...icon and/or menu item is not activated and would not respond to a user input.

in providing its basic services, the event monitor display **applet** may have the responsibility of: 1) requesting reports that are no longer on the inbox **server** to be retrieved from a report data archive if a pre-determined period of time has elapsed, e.g., 45 days, and provide these reports...

...explain reporting activity in progress; and 6) providing access to custom reporting capability via the toolbar and menu.

In the preferred embodiment, the event monitor **GUI** application is implemented in Java to ensure platform independence and particularly is developed using many of the networkMCI Interact's common objects as described herein. Particularly, the Event monitor **GUI** application, via the COApp object, may create its own display space and present its user interface in a separate frame by having the space in...a Web page, a concurrent (side-by side) access to more than one networkMCI Interact application service is possible.

In another embodiment, the event monitor **GUI** application's startup code may be implemented using the COApplet class.

-235 SUBSTITUTE SHEET (RULE 26) For determining the user's event monitor service options, the **GUI** client application requests and retrieves user profiles including the user entitlements from an event monitor customer database populated by a periodic feed (e.g., on a daily basis) from StarOE 39 (Figure 36).

From the event monitor **GUI** client application, an alarm management object is also launched upon initialization of the **GUI** client application. The alarm management object essentially creates a blank user interface and starts a thread to handle communications with the event

monitor server for...

...or frame slips exist but service is still available. A Drill down view depicting each alarm down to the individual circuit is available via the **GUI** as will be described below.

#### Reporting functionality

As described above, the existing and new event monitor reports may be requested via the report requestor, a...a variety of reports and graphical views allows them to perform customized trending and analysis for maintaining better control and problem resolution schemes during their **network management** process.

Moreover, the event monitor presents via the report viewer applet, the map of the continental U.S.

(World for global customers/services) for purposes...monitor are sent to the customers' inbox for spreadsheet display for on-line reviews. All current alarms are retrieved by the customer's web browser **GUI** applet using polling techniques at session initiation.

Customers may define a period of time during which

-239 SUBSTITUTE SHEET (RULE 26) their alarms remain in...illustrates an example of a back-end configuration 1002 for the fault management system for reporting telecommunication service conditions. The back-end configuration includes a **network management**

-241 SUBSTITUTE SHEET (RULE 26) system 1004 which collects network events, including alarms and traffic densities from a common carrier network 1006. All of the events collected by **network management** system 1004 are reported to an event monitor host 1008. The common carrier keeps track of the performance and network faults for network 1006 through a myriad of **network management** systems 1004 and routes the information in real-time to the event monitor host 1008. In order to provide information regarding a particular customer's...

...in near real-time a database of events pertinent to each customer's leased services. The accumulated data is viewable via the client browser application **GUI** and also via the StarWRS reporting system as described above. Because individual customers may subscribe to various different services which may experience different events, event monitor server 1050 must not only collect different sets of data on a real-time basis, but the client browser application **GUI** and the reporting system must also present the data in a format relevant to the particular services to which the customer subscribes. This data may...

...organized for display to the user in an event queue.

In the preferred embodiment of the present invention, event monitor host 1008 is an Integrated **Network Management** System (INMS) host implemented as an IBM S/370 mainframe and the event monitor server 1050 is implemented as the DEC Alpha and Sun Solaris...1010 comprises a

database having four partitions.

The Database 1010 includes a number of tables of data which are accessed by the client browser application **GUI** to event displays, including alarm displays, alarm report, facilities cross-references and event log displays. In addition to the StarOE SUBSTITUTE SHEET (RULE 26) authentication...the data fields on which the data to be displayed is sorted.

Once the event view has been defined, the client browser application transmits a **transaction** request to the server 1050 via the web/dispatch server. A pre defined stored procedure, which takes as input a "where" clause and an "order..."

...step 1032.

In a preferred embodiment, the primary sort criterium is severity. The sorted events are displayed to the user on the client browser application **GUI** in a step 1034. Each event displayed is accompanied by an acknowledgment field for the user to indicate his acknowledgment of the event; for example...application proxy

-247 SUBSTITUTE SHEET (RULE 26) supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

Proxy functions and utilities provided include enabling multithreaded proxy functionality in order that the proxies may service multiple clients simultaneously.

In general, the Event...

...method, if required.

In particular, the Event Monitor Server proxy 1040 is a process with multiple interfaces to the Event Monitor Web server database and **GUI** 1030, each interface providing method signatures for a series of discrete services via specific Java methods. These interface/method combinations include: 1) HSAlarmServerInterface which provides...server side method has the ability of throwing error exceptions, in lieu of generated return codes.

#### CALL MANAGER

Another application of the suite of telecommunications **network management** applications is the call manager ("CM") system which provides sophisticated mechanisms, e.g., intelligent call routing, for call center customers to control delivery of toll...The call manager webstation 1120 is typically owned and maintained by the customer. The call manager webstation 1130 includes a web-based graphical user interface ( **GUI** ) application which enables the customers to define their call terminations, and provision routing rules and associated tabular data to control routing by the SCP host 1110. The **GUI** application also presents alarms and near real time graphical

displays of peg counts and ACD-based statistics. The application also provides reports and data extracts of historical data, including call detail records (CDRs), ACD-based statistic, and peg counts. In addition, user-id administration functions including **business**

-253 SUBSTITUTE SHEET (RULE 26) hierarchy structures and function profiles may be performed via the call manager webstation's web-based **GUI** application.

in addition, the Nexus client workstation 1126 is included as an alternate client for the SCP host 1110.

The presence of the call manager...

...host systems. As shown in Figure 41, the client desktop systems 1130 with Internet connectivity have standard browsers executing Java applets, i.e., a client **GUI** application, downloaded from the call manager web server 1132. The web server 1132 which is located in the above-described demilitarized zone (DMZ) 17 of...

...by two firewalls: an Internet firewall 25(a) and an enterprise intranet firewall 25(b). The call manager integrated data server (CMIDS) generally handles the **business** and data logic associated with the call manager functionality. Each of the above components will now be described in detail with reference to additional figures.

As described above, the client webstation 1130 provides a web-based graphical user interface ( **GUI** ) offering data management and data presentation features for the call manager system. The web-based front-end **GUI** is typically written using the Java programming language to insure platform independence. The client

~vebstation 1130 typically includes a web browser with Java applets for  
...

#### Claim

##### WHAT IS CLAIMED IS:

1. An integrated system for providing a plurality of communications **network management** services and products to a customer over the public internet, said **network management** services and products accessible from a client workstation employing a client browser associated with said customer and capable of receiving web based communications from a...

...said system, each said secure web server supporting secure communications with said client workstation; (b) a plurality of client applications integrated within a web-based **GUI** and downloaded from a secure web server according to pre-determined customer entitlements, each said client application for providing a customer interface integrated within said web based **GUI** and enabling interactive communications with one or more communications **network management** resources provided by said communications service enterprise via a secure web server; and,

-338 SUBSTITUTE SHEET (RULE 26) (c) each said secure web server

supporting communication of request messages entered by said customer via said customer interface to said one or more **network management** resources capable of providing a desired communications **network management** function; wherein said one or more remote application resource processes said request messages and provides responses to said one or more secure web servers for...

...secure sockets layer communications protocol including 16 secure socket connections for encrypted communication 17 between said client browser and said secure web server, 18 said **secure server** also providing session management 19 including customer identification, validation, entitlements and encryption to link said session with 21 said customer.

1 3. The integrated system...

...secure web server to said client web 4 browser.

1 5. The integrated system as claimed in Claim 2, 2 wherein said downloaded web-based **GUI** comprises a 3 backplane object downloaded with, and launched by said 4 web-based **GUI** , said backplane object capable of launching said one or more client applications upon 6 initiation by said customer, the backplane object 7 further enabling inter interoperate with one another to provide 12 said integrated customer interface to a plurality of 13 communications **network management** products and services

-340 SUBSTITUTE SHEET (RULE 26) 1 subscribed by the customer.

1 6. The integrated system as claimed in claim 5, 2 wherein a **network management** resource comprises a 3 server for providing a customer authentication function 4 and for downloading a logon object to be launched by said web-based **GUI** , the logon object capable of 6 accepting logon **transactions** from the customer and 7 creating a session object for communicating with said 8 first server to provide said customer authentication, 9 whereby upon successful...

...validation, the logon object sends a command to the authentication server to 11 download said one or more client applications and said 12 web-based **GUI** having the backplane object.

1 7. The integrated system as claimed in claim 6, 2 further comprising: a user object for representing a 3 current customer, the user object further communicating 4 with said authentication server to determine the customer's entitlements to the web enabled 6 communications **network management** services, 7 whereby the backplane uses the entitlements to display 8 via said integrated interface only those web enabled 9 services and products to which...

...by the backplane.

1 10. The integrated system as claimed in claim 7, 2 wherein the backplane object maintains session 3 information received from a **network management** resource 4 in static memory for the duration of a session,

and enables the client applications to access the static 6 memory, whereby a need for each of the client 7 applications to communicate with remote **network** 8 **management** resources for once obtained information is 9 eliminated.

1 11. The integrated system as claimed in claim 7, 2 further comprising a set of common...

...and-feel

-342 SUBSTITUTE SHEET (RULE 26) 1 desktop window management features.

1 12. The integrated system as claimed in claim 10, 2 wherein a **network management** resource comprises a 3 server for providing a customer data report management 4 function comprising and a database for maintaining an inventory of reports associated more **network management** resources via said 12 integrated interface; and, a report viewer application 13 enabling display of reports in accordance with 14 customer-entitled reporting options.

1...

...generates a response message including a metadata description of reporting items to 6 be included in said report, whereby customer-specific 7 data from a **network management** resource and said 8 metadata description of customer-selected reporting

-343 SUBSTITUTE SHEET (RULE 26) 1 items are utilized to generate a completed report for...

...to said report requestor application when 8 generating a report request message.

1 15. The integrated system as claimed in claim 13, 2 wherein a **network management** resource further comprises 3 a report scheduler system for initiating periodic 4 generation of reports from other **network management** resources at a customer-specified frequency.

1 16. The integrated system as claimed in claim 15, 2 wherein a **network management** resource includes a 3 database for storing and maintaining customer specific 4 report data to be reported to said customer, and, a centralized inbox server...for storing and maintaining said 3 customer specific reporting data further comprises a 4 pre-defined directory associated with each of the one or more **network management** resources, wherein each of 6 the one or more **network management** resources stores the 7 report data and the notification alert data to its 8 respective pre-defined directory in the inbox server.

1 20. The integrated system as claimed in Claim 16, 2 wherein a **network management** resource provides a priced 3 call detail data reporting function for providing 4 customer specific data pertaining to usage of a customer's switched communications network.

1 21. The integrated system as claimed in Claim 20, 2 wherein a **network**

**management** resource providing a 3 priced call detail data reporting function comprises:

4 a system for extracting call detail data records from billing systems generating priced...

...customer-specific 8 Driced call deta4L-' data available at a run time.

1 23. The integrated system as claimed in Claim 16, 2 wherein a **network management** resource provides a near 3 real-time unpriced call detail data reporting function 4 for providing customer specific data pertaining to usage of a customer...

...server for obtaining recent customer-specific 7 unpriced call detail data.

1 25. The integrated system as claimed in Claim 23, 2 wherein a **network management** resource comprises:

3 a system for generating statistical data based on real 4 time call data obtained from a ...being 6 generar-ed according to said customer entitlements; and, 7 a client application for integrating retrieved 8 statis--ical data within a Web-based **GUI** for 9 presentation to said customer via said integrated interface, said Web-based **GUI** being updated to contain 11 statis--ical data at customer-specified time intervals.

-348-SUBSTITUTE SHEET (RULE 26) 1 26. The integrated system as claimed...  
...as claimed in Claim 26, 2 wherein said system for generating statistical data 3 includes scrlDt mechanism for initiating update of said 4 web-based **GUI** with most recent statistical data.

1 28. The integrated system as claimed in Claim 25, 2 wherein a **network management** resource comprises:

3 a communications network configuration device for 4 maintaining an inventory of customer's network call routing plans and associated call routing plan...

...a plurality of network control 7 elements for configuring a customer's communications 8 network according to a desired call routing plan; and, 9 a **network management** server for receiving customer request messages for accessing said call routing plan 11 details from said communications network configuration 12 device, retrieving said call routing...

...claimed in Claim 28, 2 wherein said report requestor application enables 3 generation of messages specifying customer modification 4 of said call-routing plan, said **network management** server receiving said messages via said integrated 6 interface and translating said received modification 7 request into commands for input to said network 8 configuration...

...a customer request message includes an order 3 for modifying an existing customer network call routing 4 plan for a predetermined period of time,

said **network management** server enabling said customer network to  
-350 SUBSTITUTE SHEET (RULE 26) 6 automatically revert to a corresponding  
call routing 7 plan configured prior to invocation predetermined period  
of time, said 6 **network management** server enabling said 7 allocation  
of call traffic routed to a number to 8 automatically revert to a  
corresponding percent 9 allocation specified prior to invocation of said  
order at a customer-specified revert time.

1 33. The integrated system as claimed in Claim 28, 2 wherein a **network management** resource comprises:

3 a customer's switched data circuit network; and, 4 a device for  
periodically polling network switches of said switched data circuit  
network...

...supported at said 3 selected network location includes permanent virtual  
4 circuits.

1 40. The integrated system as claimed in Claim 2 33, wherein a **network management** resource includes a 3 system for providing an alarm  
management function

-353 SUBSTITUTE SHEET (RULE 26) 4 including a device for deriving  
performance alarms based...upon acknowledgment of the alarm 8 associated  
with the trouble shooting procedure.

1 44. The integrated system as claimed in Claim 2 28, wherein a **network management** resource includes a 3 system for generating **invoice**  
documents relating to a 4 communications management services provided by  
said communications service enterprise; said integrated 6 system further  
comprising:

7 a client application downloaded...

...secure web 8 server for enabling selection and presentation of 9 -nvoice  
documents in accordance with customer entitlements, said client  
application further 11 generating an **invoice** request message in  
response to 12 customer selection of a specific **invoice** option and 13  
forwarding the **invoice** request message via the secure 14 web server;  
and

-355 SUBSTITUTE SHEET (RULE 26) an **invoice** application server for  
maintaining a 16 database of image files associated with **invoice** 17  
documents from the application service and receiving 18 the **invoice**  
request message, said **invoice** application 19 server accessing the  
database in response to a request message, generating a response message  
including a 21 customer selected **invoice** document, and downloading 22  
said response message to said client workstation, 23 whereby said  
customer selected **invoice** document is 24 formatted in a manner suitable  
for display via said integrated client interface.

1 45. The integrated system as claimed in Claim 2 44, wherein the  
database of image files further 3 includes an object database, said  
**invoice** application 4 server further comprising:

conversion process for imaging documents by defining 6 key information necessary to retrieve documents from 7 the communications application service includes an index database, said **invoice** application

-356 SUBSTITUTE SHEET (RULE 26) 4 server further including index load process for storing index pointers pointing to the compressed documents 6 into the index database.

1 47. The integrated system as claimed in Claim 2 28, wherein a **network management** resource further 3 comprises a system for providing a circuit switched 4 call center management function, said integrated system further comprising:

6 a client application...

...for enabling a customer to monitor, define, and 8 manipulate call routing parameters, the client 9 application further formatting customer defined parameters into client message **transactions** and 11 communicating the client message **transactions** to the 12 **secure server** over the secure connection; and, 13 a routing engine device for maintaining call 14 routing rules and interfacing with said plurality of network control elements...

...SHEET (RULE 26) 1 48. The integrated system as claimed in Claim 2 47, further comprising a proxy server for processing a 3 plurality of **transaction** requests received from the 4 client application via the **secure server** by opening a connection to the routing engine device and retrieving 6 information relating to the **transaction** requests and 7 forwarding back the information to the client 8 application via the **secure server**, and wherein the 9 client application presents the information to the customer at the client workstation.

1 49. The integrated system as claimed in Claim...

...and the plurality of network control elements, said one or more databases residing with the 6 proxy server, the proxy server further processing 7 predetermined **transaction** requests locally by 8 retrieving information related to the **transaction** 9 requests from said one or more database(s), and forwarding the information to the client application.

1 50. The integrated system as claimed in...SHEET (RULE 26) 2 further comprising:

3 a client application downloaded from said secure 4 web server for enabling customers to manage and track outbound **network management** features associated with 6 that customer's communications network; and, 7 an outbound **network management** server for receiving 8 requests for outbound **network management** features 9 associated with a customer network including calling party numbers, dialing plans, calling card number and 11 customer identification code sets, or, combinations 12 thereof, translating said received requests into 13 commands for retrieving said outbound **network management** feature information from said communications network configuration device, and downloading

response 16 messages including said requested outbound **network** 17 **management** feature information to said customer via 18 said -Integrated interface.

1 58. A method for enabling customer management of 2 their communications network assets via...including the steps of identifying, 22 validating, and determining the customer's entitlements 23 within the network; 24 (c) initiating download of a web-based **GUI** from said secure web server, said downloaded web-based 26 **GUI** capable of launching one or more of a plurality of 27 client applications available to a customer according 28 to pre-determined customer entitlements, 29 (d) providing a customer interface integrated within said web-based **GUI** upon launch of a selected 31 client application, said customer interface enabling 32 interactive communication of request messages with one

-362 SUBSTITUTE SHEET (RULE 26) 33 or more of a plurality of communications **network** 34 **management** resources capable of providing a selected communications **network** **management** function; 36 (e) a communications **network** **management** 37 resource receiving said request messages, generating a 38 proxy request corresponding to a request message, 39 providing responses according to said request, and communicating...

...said secure web server 41 secure uploading to said customer workstation for 42 display via said integrated interface, whereby customer 43 management of its communications **network** **management** 44 assets via the public internet is enabled.

1 59. The method as claimed in claim 58, wherein a 2 secure web server supports a...

...protocol, said secure web server 4 supporting secure socket connections for encrypted communication between said client web browser and said 6 secure web server, said **secure server** also providing 7 session management including client identification, 8 validation and session management to link said session 9 with said client.

11 60. The method...

...providing a dispatch server for

-363 SUBSTITUTE SHEET (RULE 26) 1 communicating with a secure web server and each of said 2 plurality of said **network** **management** resources, said 3 dispatch server verifying system access and proxy 4 generation for said system resources after said customer's entitlements have been verified.

1...

...a secure 3 web server to said client web browser.

1 62. The method as claimed in Claim 60, wherein 2 said downloaded web-based **GUI** comprises a backplane 3 object downloaded with, and

launched by said web based 4 **GUI** , said backplane object launching said client applications programs upon initiation by said customer, 6 the backplane object further enabling inter-application 7 communications among the...

...whereby said backplane 9 object and the client applications interoperate with one another to provide said integrated customer 11 interface to a plurality of communications **network** 12 **management** products and services subscribed by the 13 customer.

63. The method as claimed in claim 62, wherein a -364 SUBSTITUTE SHEET (RULE 26) 1 **network management** resource comprises a server for 2 providing a customer authentication function, said 3 method comprising:

4 downloading a logon object to be launched by said web-based **GUI** ; 6 accepting logon **transactions** from the customer and 7 creating a session object for communicating with said 8 authentication server to provide said customer 9 authentication; and, upon successful customer validation, sending a 11 command to the authentication server to download said 12 one or more client applications and said web-based **GUI** 13 having the backplane object.

1 64. The method as claimed in claim 63, further 2 comprising:

3 prov 4 ding a customer objecz. for...

...a 4 current customer, the customer object communicating with said authentication server to determine the 6 customer's entitlements to the web enabled 7 communications **network management** services, 8 whereby the backplane uses the entitlements to 9 display via said integrated interface only those web enabled services to which the customer has...

...of:

3 executing a client application directly by the 4 backplane object when the customer selects a client application associated with a desired communications 6 **network management** service, the selected client 7 application running in a frame independent Prom a web 8 browser's window.

1 66. The method as claimed in claim 6-5, further 2 including the step of:

3 maintaining session information received from a 4 **network management** resource in static memory for the duration of a session, and enabling the client 6 applications to access the static memory, 7 whereby a need for each of the client 8 applications to communicate with remote **network 9 management** resources servers for once obtained information is eliminated.

1 67. The method as claimed in claim 65, wherein 2 said client applications utilizing a set...

...common look-and-feel desktop window management features.

-366 SUBSTITUTE SHEET (RULE 26) 1 68. The method as claimed in claim 66, wherein a 2 **network management** resource comprises a report manager 3 server for providing a customer data report management 4 function and a database for maintaining an inventory of reports...

...r specific 9 reports pertaining to usage of their switched communications networks and initiating generation of 11 report request messages for said one or more **network 12 management** resources via said integrated interface; 13 and, 14 providing a report viewer application enabling display of reports in accordance with customer-entitled 16 reporting options customer-specific data from a **network management** resource and said metadata description of 11 customer-selected reporting items are utilized to 12 generate a completed report for presentation to said 13 customer...

...1 71. The method as claimed in claim 69, further 2 including: providing a report scheduler system for 3 initiating periodic generation of reports from **network 4 management** resources at a customer-specified frequency.

1 72. The method as claimed in claim 71, wherein a 2 **network management** resource includes a database for 3 storing and maintaining customer specific report data 4 to be reported to said customer, and, a centralized inbox server...  
...integrated 9 interface.

1 73. The method as claimed in claim 72, wherein 2 said inbox server stores a notification alert received 3 from a **network management** resource that a generated 4 report is available, said method including:

launching an inbox client application from the 6 backplane for receiving and presenting the...

...said inbox 4 server and customer specific reporting data storage database, a pre-defined directory being associated with 6 each of the one or more **network management** resources, 7 each of the **network management** resources storing 8 reporting data and the notification alert data to its 9 respective pre-defined directory in the inbox server.

1 76. The method as claimed in Claim 74, wherein a 2 **network management** resource provides a priced call 3 detail data reporting process for providing customer 4 ...8 customer-specific priced call detail data available at 9 a run time.

1 78. The method as claimed in Claim 74, wherein a 2 **network management** resource provides a near real-time 3 unpriced call detail data reporting function for 4 providing customer-specific unpriced call detail data pertaining to usage...

...reporting 6 server for obtaining recent customer-specific unpriced 7 call detail data.

1 80. The method as claimed in Claim 78, wherein a 2 **network**

**management** resource comprises a system for 3 generating statistical data based on real-time call 4 data obtained from a circuit-switched communications network, said statistical...

...6 according to said customer entitlements, said method 7 comprising:

-372 SUBSTITUTE SHEET (RULE 26) 8 integrating retrieved statistical data within a 9 Web-based **GUI** for presentation to said customer via said integrated interface, said Web-based **GUI** being 11 updated to contain statistical data at customer 12 specified time intervals.

1 81. The method as claimed in Claim 80, further 2 including implementing a script mechanism for 3 initiating update of said web-based **GUI** with most 4 recent statistical data.

1 83. The method as claimed in Claim 72, wherein a 2 **network management** resource comprises a communications 3 network configuration device for maintaining an 4 inventory of customer's network call routing plans and associated call routing plan...

...a customer's communications network 8 according to a desired call routing plan; said method 9 further comprising:

-373 SUBSTITUTE SHEET (RULE 26) providing a **network management** server for 11 receiving customer request messages for accessing said 12 call routing plan details from said communications 13 network configuration device; 14 retrieving said...

...method as claimed in Claim 83, further 2 comprising:

3 generating a customer request message specifying 4 customer modification of said call-routing plan, said **network management** server receiving said request 6 messages via said integrated interface and translating 7 said received modification request into commands for 8 iniDut to said network...

...a customer request message including an 4 order for modifying an existing customer network call routing plan for a predetermined period of time, said 6 **network management** server enabling said customer 7 network to automatically revert to a corresponding call 8 routing plan configured prior to invocation of said 9 order at...

...allocation of call ::raffic routed to a network number used in a Darticular 6 call routing plan for a predetermined period of time, 7 said **network management** server enabling said 8 allocation of call traffic routed to a number to 9 automatically revert to a corresponding percent allocation specified prior to invocation...

...order 11 at a customer-specified revert time.

-375 SUBSTITUTE SHEET (RULE 26) 1 88. The method as claimed in Claim 83, wherein a 2 **network management** resource comprises:

3 a customer's switched data circuit network; and, 4 a device for

periodically polling network switches of said switched data circuit network...8 characteristics relating to physical circuits supported 9 at said selected network location.

1 94. The method as claimed in Claim 88, wherein a 2 **network management** resource includes a system for 3 providing an alarm management function including a 4 device for deriving performance alarms based on performance statistics collected on...6 upon acknowledgment of the alarm associated with the 7 trouble shooting procedure.

1 98. The method as claimed in Claim 72, wherein a 2 - **network management** resource includes a system for 3 generating **invoice** documents relating to 4 communications **network management** services provided by said communications service enterprise, said method 6 -further comprising:

7 **downloading** a client **application** from the secure 8 web **server** for enabling selection and presentation of 9 **invoice** documents in accordance with customer entitlements;

-379 SUBSTITUTE SHEET (RULE 26) generating customer request messages including 12 customer selection of a specific **invoice** option; 13 providing an **invoice** application server for 14 maintaining a database of image files associated with **invoice** documents from the application service, said 16 **invoice** application server: receiving the **invoice** 17 request message from said customer; 18 accessing the database in response to a request 19 message; generating a response message including a customer 21 selected **invoice** document; 22 downloading said response message to said client 23 workstation; and, 24 formatting said customer selected **invoice** document in a manner suitable for display via said integrated 26 client interface.

1 99. The method as claimed in Claim 98, wherein 2 the database of image files further includes an object 3 database, said **invoice** application server further:

4 converting **invoice** documents to images; defining key information necessary to retrieve 6 documents from the communications **network management** 7 resource application service and compressing the 8 documents for storing; and

-380 SUBSTITUTE SHEET (RULE 26) 9 loading the compressed documents into the object...

...index 4 pointers for pointing to the compressed documents in the index database.

1 101. The method as claimed in Claim 72, wherein a 2 **network management** resource further comprises a system 3 for providing a circuit switched call center management 4 function, said method further comprising:

**downloading** a client **application** from the secure 6 web **server** for

enabling a customer to monitor, define, 7 and manipulate call routing parameters, the client 8 application further formatting customer defined 9 parameters into client message **transactions** and communicating the client message **transactions** to the 11 **secure server** over the secure connection; and, 12 providing a routing engine device for maintaining 13 call routing rules and interfacing with said plurality 14 of network a plurality of **transaction** 3 requests received from the client application via the 4 **secure server** by opening a connection to the routing engine device; and, 6 retrieving information relating to the **transaction** 7 requests and forwarding back the information to the 8 client application via the **secure server**, said client 9 application presenting the information to the customer at the client workstation via said integrated 11 interface.

1 103. The method as claimed...

...device and the plurality of network control elements, said one or more databases operating 6 in conjunction with a proxy server for processing 7 predetermined **transaction** requests locally by 8 retrieving information related to the **transaction** 9 requests from said one or more database(s), and

-382 SUBSTITUTE SHEET (RULE 26) forwarding the information to the client application.

1 104. The...

5/3,K/2 (Item 2 from file: 349)

DIALOG(R) File 349:PCT Fulltext  
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00632966 \*\*Image available\*\*

**INTEGRATED PROXY INTERFACE FOR WEB BASED TELECOMMUNICATION TOLL- FREE NETWORK MANAGEMENT**  
**INTERFACE MANDATAIRE INTEGREE DE GESTION DE RESEAUX DE NUMEROS VERTS DE TELECOMMUNICATIONS BASEE SUR LE WEB**

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**INTEGRATED PROXY INTERFACE FOR WEB BASED TELECOMMUNICATION TOLL- FREE NETWORK MANAGEMENT**

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Detailed Description

Claims

English Abstract

A Web/Internet based toll-free **network management** tool (200) that enables customers (100) of telecommunication network providers to modify the configuration of their toll-free networks via a Web/Internet-bases graphical...

Detailed Description

**INTEGRATED PROXY INTERFACE FOR WEB BASED  
TELECOMMUNICATION TOLL-FREE NETWORK MANAGEMENT**

The present invention relates generally to information delivery systems and, particularly, to a novel, WWW/Internet-based, telecommunications **network management** service for customers of a telecommunications service provider.

Telecommunications service entities, e.g., MCI, AT&T, Sprint, and the like, presently provide for the presentation and dissemination of customer account and **network data management** information to their customers predominantly by enabling customers (clients) to directly dial-up, e.g., via a modem, to the entity's application servers to...

...to respond to traffic conditions, emergencies etc.

The assignee of the present invention, MCI, currently provides an MCI ServiceView (11MSV11) product line that provides its **business** customers with Windows based client-server applications including an 800 Network Manager (11800NM11) which is a PC-Windows based **GUI** to MCI's Network Control System ("NCS").

Particularly, NCS is used to perform enhanced routing on MCI's network for special service calls. The legacy...determines signaling), and overflow routing.

Currently, the IMPL, FEAT, and QUIK orders are provided by the MSV BOONM

platform.

While the current 800NM and tollfree **network management** features in the current MSV platform are sufficient for those with existing access, a need exists to provide a newer, faster platform with new toll free **network management** capabilities for customers through the public Internet.

Moreover, a need exists to integrate the existing tollfree **network management** client-server application in a Web-based platform which provides SUBSTITUTE SHEET (RULE 26) expedient comprehensive and more secure data access and reporting services to customers from any Web browser on any computer workstation anywhere in the world.

The present invention is directed to a novel toll-free **network management** tool for a Web-based (Internet and Intranet) client-server application that enables customers to define their own 800/8xx toll free number routing plans via the Web/Internet. The toll free **network management** tool enables customers to change and modify their existing 800/8xx toll free number routing plans, e.g., specifying routing rules for directing 800/8xx...

...criteria. The client server application is a Web-based, object-oriented application that implements a Remote Method Invocation-like protocol providing customers with toll-free **network management** features including: stacking order capability, e.g., to temporarily change the routing of toll free traffic; enabling enhanced order queries; enabling the automatic notification of order completion or rejection; and providing enhanced inventory reporting.

According to the principles of the invention there is provided a toll-free **network management** tool that enables customers of telecommunications network providers to modify the configuration of their toll free networks via a Web/Internet-based graphical user interface... the software architecture of the networkMCI Interact system; Figure 3 is an illustrative example of a backplane architecture schematic; Figure 4 illustrates an example client GUI presented to the client/customer as a browser web page; Figure 5 is a diagram depicting the physical networkMCI Interact system architecture; Figure 6 is...  
...exemplary screen display showing the options for changing existing network plan routing orders.

The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system ("nMCI Interact") such an integrated suite of Web-based applications provides...on a customer work station 10 and provides customer access to the enterprise system, having one or more downloadable application objects directed to front end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer requested...

...customer workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or Call Manager functions. The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects which provide the front end **business** logic and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as: 1) session management; 2) application **launch** ; 3) inter **application** communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

SUBSTITUTE SHEET (RULE 26)

Figure 3...

...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 80 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor 72; an alarm monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also...

...77 SUBSTITUTE SHEET (RULE 26) for providing enhancements and functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to start, stop, and...Figure 2, it is understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer

Service Management legacy platform 40(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and 40(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted...

...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request ...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 30 and Legacy Mainframe Systems '40 which comprise the back end **business** logic applications.

As illustrated in Figure 5, the present invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between two...reports, such as provided by MCI's StarODS Server 33 in a variety of user selected formats.

All reporting is provided through a Report Requestor **GUI** application interface which support spreadsheet, a variety of graph and chart type, or both simultaneously. For example, the spreadsheet presentation allows for sorting by any...

...the inbox when a report is selected.

A common database may be maintained to hold the common configuration data which can be used by the **GUI** applications and by the mid-range servers. Such common data will include but not be limited to:

SUBSTITUTE SHEET (RULE 26)  
customer security profiles, billing...actual identified sender. One technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** .

Another component of the nMCI Interact infrastructure includes order entry, which is supported by the Order Entry ("StarOE") server. The general categories of features to...

...invention focuses on the client and middle-tier service that enables customers to request, specify, and receive and view data pertaining to their toll free **network management** assets, e.g., toll free number

routing plans, and to generate orders for changing aspects of the routing plans via a World Wide Web interface.

As shown in Figure 6, the toll free **network management** tool 200 of the invention, referred to herein as "TFNM," implements a TFNM domain server 250 which is one component part of a back-end...

...Access Points 242 ("DAP"). As will be described in greater detail, the TFNM tool 200 of the invention enables customers to change their toll-free **network management** plans, both in real-time and on a scheduled basis, via nMCI Interact's ...interface. These directives are preferably communicated as Java applets over secure TCP/IP socket connections for input over the firewall (b) to at least one **secure server**, e.g., a DMZ Web server that provides for authentication, validation, and session management. As will be described, the TFNM server 250 interfaces with the...

...protocol for providing secure, client-to-server communication with Java RMI-like semantics and comprises a library of Java classes used by-both the client **applet** and **server application**. In view of Figure 6, the communication path from the client and the **server** is as follows:

10- The TFNM server application 250 registers remote objects with CORMI's CORRemoteSessionServer (analogous to Java RMI's Registry service) and then blocks waiting for connections. The TFNM client **applet** initiates communication ...COClientSession object. The COClientSession Creates a COSynchTransaction (an atomic unit of work based over an HTTPS socket) which connects to the MCI Interact system dispatcher **server** 235 (which is behind the outer firewall 25(b)). The dispatcher **server** 235 process validates the client's authorization to logon (a process that involves contacting the StarOE service and generating a session key with a 'cookiejar...

...a list of all the authorized applications from the StarOE server, as indicated at step 310. At steps 312 and 314 respectively, a networkMCI Interact **applet** is downloaded to the customers Web Browser via the established HTTPS connection, and the browser presents the customer with the networkMCI Interact systems home page...attached to the selected Time interval node equals 100 percent. Action keys 415a-415d may additionally be enabled for user selection in accordance with enterprise **business** rules and/or user security.

Specifically, key 415a enables the submission of the QUIK/TEMP QUIK order to NetCap for approval (issue key). Key 415b is communicated by the TFNM client **applet** by communication between the Dispatcher **server** 235 and the TFNM **server** objects using CORMI.

The Object manager/sub-classes execute methods for SUBSTITUTE SHEET (RULE 26) translating the QUIK/TEMP QUIK order in a form suitable...herein, embody the principles of the invention and are SUBSTITUTE SHEET (RULE 26) thus within its spirit and scope. For instance, although, the web/Internet **network management** tool described herein is described with respect to customer's toll-free, e.g., 1-800/8xx networks, the

principles may be readily applied to...

Claim

WHAT IS CLAIMED IS:

1 1. An interactive Web/Internet based  
2 **network management** system for enabling configuration of 3 a  
customer's telecommunications network via an 4 integrated interface, said  
system comprising:

a client browser application located at a 6 client workstation for  
enabling interactive Web based 7 communications with said **network**  
**management** system, said client workstation identified with a customer  
and 9 providing said integrated interface; at least one **secure server**  
for managing 11 client sessions over the Internet, said **secure server**  
12 supporting a secure connection enabling encrypted 13 communication  
between said client browser application 14 and said **secure server** ; a  
network configuration system for maintaining an 16 inventory of a  
customer's telecommunications network 17 call routing plans and  
associated plan details, and 18...

...for 19 configuring a customer's telecommunications network according to  
a desired call routing plan; and, 21 a network manager in communication  
with said 22 **secure server** for receiving customer directives 23  
communicated over said secure connection, said 24 directives including a  
request to access call routing plan details according to a...

...over said secure communications link for 28 visual presentation at said  
client workstation.

SUBSTITUTE SHEET (RULE 26)

1 2. The interactive Web/Internet based  
2 **network management** system as claimed in Claim 1, 3 wherein said  
client browser application enables 4 customer modification of said  
call-routing plan details via said integrated...

...for input to said network configuration system and forwarding said  
commands to said network 11 configuration system.

1 3. The interactive Web/Internet based  
2 **network management** system as claimed in Claim 2, 3 wherein said  
customer request messages include unique 4 customer identifiers enabling  
downloading of specific call routing plan details.

1 4. The interactive Web/Internet based  
2 **network management** system as claimed in Claim 3, 3 wherein said  
call routing plans pertain to a customer's 4 toll-free call network, said  
unique customer identifier including a specific toll-free number having  
one or 6 more call routing plans associated therewith.

1 5. The interactive Web/Internet based  
2 **network management** system as claimed in Claim 3, 3 wherein said  
call routing plans pertain to a customer's 4 toll-free call network, said

unique customer...

...a corporate identifier having one or more 6 call routing plans associated therewith.

SUBSTITUTE SHEET (RULE 26)

1 6. The interactive Web/Internet based

2 **network management** system as claimed in Claim 2, 3 wherein said customer directive includes an order to 4 temporarily modify an existing network call routing plan for a predetermined period of time.

1 7. The interactive Web/Internet based

2 **network management** system as claimed in Claim 6, 3 wherein said customer directive enables ...configured prior to invocation of 6 said directive, said directive including a revert date 7 and time.

1 8. The interactive Web/Internet based

2 **network management** system as claimed in Claim 2, 3 wherein said customer directive includes an order to 4 temporarily modify a percent allocation of call traffic routed to a number used in a particular routing plan.

1 9. The interactive Web/Internet based

2 **network management** system as claimed in Claim 8, 3 wherein said customer directive enables said allocation 4 of call traffic routed to a number to automatically revert...

...percent allocation prior to 6 invocation of said directive, said directive including 7 a reverting date and time.

10. The interactive Web/Internet based

2 **network management** system as claimed in Claim 8, 3 wherein said directives are communicated from said 4 integrated interface over said secure connection to SUBSTITUTE SHEET (RULE 26) said network manager by a remote method invocation-like 6 protocol.

1 11. The interactive Web/Internet based 2 **network management** system as claimed in Claim 4, 3 wherein modifiable call routing plan details include 4 one selected from the group of: origin, country, state, day of week, time of day and termination, and any 6 combination thereof.

1 12. The interactive Web/Internet based 2 **network management** system as claimed in Claim 2, 3 wherein said client browser application includes 4 process for enabling construction of a new routing plan associated with a telephone number.

1 13. The interactive Web/Internet based 2 **network management** system as claimed in Claim 2, 3 wherein said network manager further comprises process 4 for verifying customer entitlements prior to downloading call routing plans details to said 6 requesting customer.

1 14. A Web/Internet based **network management** 2 system for enabling configuration of a customer's 3 telecommunications network via an

integrated interface, 4 said system comprising:

a client browser application located at a 6 client workstation for enabling interactive Web based 7 communications with said **network management** system, 8 said client workstation identified with a customer and 9 providing said integrated interface; SUBSTITUTE SHEET (RULE 26) at least one **secure server** for managing 11 client sessions over the Internet, said **secure server** 12 supporting a secure connection enabling encrypted 13 communication between said browser application client 14 and said **secure server** ; network manager for receiving customer 16 directives communicated over said secure communications 17 link, said directives including a request to access 18 call routing plan ...network is thereafter configured according to said 29 commands and modified call-routing plan details included therein.

1 15. The interactive Web/Internet based 2 **network management** system as claimed in Claim 14, 3 wherein said customer request messages include unique 4 customer identifiers enabling downloading of specific call routing plan information.

1 16. The interactive Web/Internet based 2 **network management** system as claimed in Claim 15, 3 wherein said call routing plans pertain to a customer's 4 toll-free call network, said unique customer...

...26) including a specific toll-free number having one or 6 more call routing plans associated therewith.

1 17. The interactive Web/Internet based 2 **network management** system as claimed in Claim 15, 3 wherein said call routing plans pertain to a customer's 4 toll-free call network, said unique customer identifier including a corporate identifier having one or more 6 call routing plans associated therewith.

1 18. The interactive Web/Internet based 2 **network management** system as claimed in Claim 14, 3 wherein said customer directive includes an order to 4 temporarily modify an existing network call routing plan for a predetermined period of time.

1 19. The interactive Web/Internet based 2 **network management** system as claimed in Claim 18, 3 wherein said customer directive enables said call 4 routing plan to automatically revert to a corresponding call routing...

...configured prior to invocation of 6 said directive, said directive including a revert date 7 and time.

1 20. The interactive Web/Internet based 2 **network management** system as claimed in Claim 15, 3 wherein said customer directive includes an order to 4 temporarily modify a percent allocation of call traffic routed to a number used in a particular routing plan.

1 21. The interactive Web/Internet based 2 **network management** system as claimed in Claim 20, SUBSTITUTE SHEET (RULE 26) 3 wherein said customer directive enables said allocation 4 of call traffic routed to a

5/3,K/3 (Item 3 from file: 349)  
DIALOG(R) File 349:PCT Fulltext  
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00632956 \*\*Image available\*\*

**INTEGRATED CUSTOMER WEB STATION FOR WEB-BASED CALL MANAGEMENT**  
**POSTE WEB CLIENT INTEGRE POUR LA GESTION D'APPELS BASEE SUR LE WEB**

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Detailed Description  
Claims

Detailed Description

... a modem, or, alternatively, via dedicated communication lines, e.g.,  
ISDN, T-1, etc., to the entity's application and database servers, and  
initiate the **network management** application through the graphical  
user interface ( **GUI** ). Frequently, a dial-up modem and communications  
software interact with each other in many ways which are not always  
predictable to a custom application, requiring...SUBSTITUTE SHEET (RULE

26) browser on any computer workstation anywhere in the world.

The present invention is one component of an integrated suite of customer **network management** and report applications using the Internet and a World Wide Web ("WWW" or "Web") Web browser paradigm. Introduced to the communications industry as the "networkMCI...reports on provisioning and statistical data as well as view, print, or extract files for further analysis.

The present invention also includes a user and **business** hierarchy maintenance feature for providing users with appropriate privileges with the ability to define **business** hierarchies, e.g., corporate or account group, to create and maintain user identifiers (ids), and to assign data access privileges.

In addition, the present invention...

...web browser, HTML files including SUBSTITUTE SHEET (RULE 26) files within which scripts written in JavaScript client scripting language are embedded, and Java application and **applet** codes, which are executed on the customer's desktop system, i.e., a workstation. The Java classes providing the user interface include user and **business** hierarchy, call by call application, graphic data display, alarm manager, and reporting/data extraction, each of which provides a corresponding application feature supported by the present invention. The above client browser software physically resides on a web **server** and is downloaded dynamically to the customer's system via their web browser and an Internet connection.

The present invention also includes one or more **transaction** manager for receiving the web client **transaction** messages and communicating them to the back-end servers.

The present invention also includes a proxy server for servicing the client **transactions** which are communicated over the Internet via the web servers by interfacing with the systems implementing the routing engine and network elements which provide and...

...RULE 26) reporting functionality to the customers at the client workstation. The proxy server is generally responsible for receiving and reformatting the web client **transactions** into commands compatible with the routing engine which may be implemented in a host system, and also for the reverse process, i.e., receiving the routing engine **transactions** and reformatting them into web client message **transactions** for transmitting them to the web client via the web servers, thereby providing services to both the web client and the routing engine. It should...

...3 is an illustrative example of a backplane architecture schematic viewed from a home SUBSTITUTE SHEET (RULE 26) page; Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 5 illustrates an example of call manager webstation application physical architecture when one or...classes used in branding

process.

An overview of the Web-enabled integrated system. The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system ("riMCI Interact") such an integrated suite of Web-based applications provides...

...resident on a customer workstation 10 and provides customer access to the enterprise system, having one or more downloadable application objects directed to front-end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer requested ...customer workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or call **management** functions.

The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview of the software...

...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects that provide the front-end **business** logic. The backplane services layer 12 also manages the **launching** of the **application** objects. The networkMCI Interact common set of objects provide a set of services to each of the applications. The set of services include: 1) session management; 2) application launch ; 3) inter- **application** communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 3 is a diagrammatic example...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 250 providing, for example, a suite

252 of **network management** reporting applications including: MCI Traffic Monitor 252c; Call Manager 252f; a Network Manager 252e and Online **Invoice** 252i. Access to network functionality is also provided through Report Requester 252b, which provides a variety of detailed reports for the client/customer and a Message Center 252a for providing enhancements and functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all those client applications implemented as deriving from the COApp or COApplet...SUBSTITUTE SHEET (RULE 26) understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. As shown in Figure 2, other legacy platforms 40(b), 40(c) and 40(d), 610 may communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(b)-(d), 610 are illustrative only and it is understood other legacy platforms may be...includes a communications component offering three (3) SUBSTITUTE SHEET (RULE 26) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly. Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request...

...reports, such as provided by MCI's StarODS Server 33 in a variety of user selected formats.

All reporting is provided through a Report Requestor **GUI** application interface which supports SUBSTITUTE SHEET (RULE 26) spreadsheet presentation, a variety of graph and chart type presentations, or both simultaneously. For example, the spreadsheet...

...the inbox when a report is selected.

A common database may be maintained to hold the common configuration data which may be used by the **GUI** applications and by the mid-range servers. Such common data includes but are not limited to: customer security profiles, billing hierarchies for each customer, general...actual identified sender. one technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** .

Another component of the nMCI Interact infrastructure includes order entry, which is supported by the Order Entry ("StarOE") server. The general categories of features to...

...10) Call Manager. The order entry functionality is extended to

additionally support 11) Event Monitor; 12) Service Inquiry; 13) Outbound Network Manager; and, 14) Online **Invoicing** .

The self-monitoring infrastructure component for nMCI Interact is the employment of mid-range servers that support SNMP alerts at the hardware level.

In addition...

...Monitor, and system administration applications. Further functionality integrated into the software architecture includes applications such as Outbound Network Manager, Call Manager, Service Inquiry and online **invoicing** .

Call manager webstation application

The call manager system or the present invention provides sophisticated mechanisms, e.g., intelligent call routing, for call center customers to...The call manager webstation 620 is typically owned and maintained by the customer.

The call manager webstation 630 includes a web-based graphical user interface ( **GUI** ) application which enables the customers to define their call terminations, and provision routing rules and associated tabular data to control routing by the SCP 610. The **GUI** application also presents alarms and near real time graphical displays of peg counts and ACD based statistics. The application also provides reports and data extracts of historical data, including call detail records (CDRs), ACD-based statistic, and peg counts. In addition, user-id administration functions including **business** hierarchy structures and function profiles may be performed via the call manager webstation's web-based **GUI** application.

Call Manager Webstation architecture

Figure 7 illustrates the call manager webstation component architecture of the present invention, showing interconnections among the components. In a...shown in Figure 7, the client desktop systems 630 with Internet connectivity have standard browsers executing Java applets, hereinafter referred to also as a client **GUI** application, downloaded from the web server 632. The web server 632 which is located in the demilitarized zone (DMZ) of the network MCI Interact, include...

...generally bounded by two firewalls: an Internet firewall 660 and an enterprise intranet firewall 662. The call manager integrated data server (CMIDS) generally handles the **business** and data logic associated with the call manager functionality. Each of the above components will now be described in detail with reference to additional figures.

As described above, the client webstation 630 provides a web-based graphical user interface ( **GUI** ) offering data management and data presentation features for the call manager system. The web-based front-end **GUI** is typically written using the Java programming language to insure platform independence. The client webstation 630 typically

includes a web browser with Java applets for...

...servers 632 and are dynamically downloaded to the client browsers (client webstations) 630 when the Uniform Resource Locator (URL) for the call manager webstation client **GUI** application is accessed.

The call manager webstation client **GUI**

application of the system of the present invention is invoked by clicking an icon labeled "call manager" (Figure 4 at 252f) from the networkMCI Interact...

...consistent look and feel throughout the web environment. The main features offered include: user setup and administration, i.e., security functions (Figure 13 at 882); **business** hierarchy setup; call by call application for rules writing and provisioning (Figure 13 at 874, 884); graphic data display (Figure 13 at 878); alarm manager...illustrates the typical objects making up the client interface code in one embodiment of the present invention. The user interface classes 634 represent the main **GUI** objects for performing call manager specific functionality. Each of the classes, i.e., user and **business** hierarchy setup, call by call application, graphic data display, alarm manager, reporting extracts, and authentication/entitlements, performs the corresponding client-side functionality associated with the...

...through to the back-end server. The communication classes (not shown) are employed between the client browser 630 and the web server 632 for requesting **transactions** and/or data sets from the web server 632.

In one embodiment of the invention, the communications from the client 630 and back-end (Figure...

...then relays the request to the appropriate proxy process. Results are returned from back-end processes to the requesting client in the same manner. Each **transaction** or data request may be executed as a separate process, to allow processing to continue from other applications within the call manager webstation system.

In...

...NSAPI module, it invokes a particular function in the module which performs essentially the same function as the CGI program. For example, a middle tier **transaction** handler, typically a message manager (msgmgr) and residing with the web servers 632, may be modified to use the NSAPI instead of the HTTP CGI...

...in from the web client 630.

In general, and as described above, the web server 632 provides a communication pass-through between the web client **GUI** application 630 and the back-end call manager integrated data server (CMIDS) 640 which may communicate with the routing engine, e.g., SCP. Figure 8...632 includes an HTTP service manager 652 and a message manager 656. The HTTP service manager 652 generally handles requests from multiple clients 630

to download web pages and **Java** applets for display within a browser. Web pages include hypertext markup language SUBSTITUTE SHEET (RULE 26) (HTML) files and-**Java** applets 654 that are downloaded to the clients 630 and are executed within a browser by the **Java** applets. The HTTP service manager 652 also handles message **transactions** via the POST method defined by the hyper-text transfer protocol (HTTP) protocol. The HTTP service manager may be standard off-the-shelf World Wide Web **server** software, e.g., Netscape Enterprise **Server** .

The message manager 656 is typically a CGI program that is executed as a spawned process within the HTTP service manager 652 when a message **transaction** is received from the client via the POST method sent to the HTTPS port (443) 650. The HTTP service manager 652 spawns a process to run an instance of the message manager 656 each time it receives a message **transaction** from the client. Alternately, the message manager 656 may be implemented as a function in the NSAPI module as described above. The HTTP service manager...

...the proxy server 670 and re-wrapping this message with dispatcher and proxy header and sending this formatted message to the web client 630. Message **transactions** are sent to the proxy server 670 over a new connection by opening a new TCP socket to the proxy server 670 while the original...

...the HTML files and **Java** applets 654 to the client 630 upon request via the HTTPS port 650, typically configured to port number 443. Each **transaction** from a client 630 is sent to ...to the CMID 640, or alternately, as will be described below, to the proxy server component of the CMID 640.

As described above, the message **transactions** created by the client 630 may be transmitted over HTTPS using the POST method defined within the HTTP protocol.

Using the POST method, a specified...

...stream and an output stream within the thread.

As described previously, the HTTP service manager 652 spawns a message manager process 656 for each message **transaction** sent to web server 632. Each message **transaction** is a single request from the client 630 that is answered by a single reply from the web server 632.

The web server 632 also...

...a client 630 logs onto the web server 632 and when the client logs off. During a session, a client 630 may submit many message **transactions** to the web server 632. State data for each session is stored in the session table 660. Session entries are deleted from the session table 660 when a user logs off or when a session is aged. Each message **transaction** received by the web server 632 is associated with an active session. If a session no longer exists for a particular **transaction** , the message **transaction** is returned to the client 630 as rejected. The application then may prompt the user to login again.

Generally, the session table 660 is a...

...a "session id" which is a unique server-generated key. The client holds this and returns it to the server as part of subsequent message **transaction**. The session table 660 maintains a "session key table" which maps these keys to the associated session. The session table also includes a time stamp for each client session. A client session's time stamp is updated each time a message **transaction** containing the session id for the session is received. A session is aged if no message **transactions** belonging to the session are seen after a given amount of time. If so, the session, with its entry deleted from the session table 660...session has aged, the session entry for the aged session is cleared from the session table 660. Clearing the session entry forces any further message **transactions** associated with the session identifier to be rejected, requiring the user to restart the session.

For communications to and from the web client 630 and...

...tier web server 362 supports three types of transportL mechanism which are provided by the networkMCI Interact platform:

synchronous, asynchronous, and bulk transfer. The Synchronous **transaction** type typically has a single TCP connection which is kept open until a full message reply has been retrieved. The Asynchronous **transaction** type is typically used for handling message **transactions** requiring a long delay in the back-end server response. A server process handling the message **transaction** responds back to the web client 630 immediately with a unique **transaction** identifier and then closes the connection. The web client 630 may then poll the web server 632 using the **transaction** identifier to determine when the original message **transaction** has completed. The bulk transfer type of transport mechanism is typically used for large data transfers which may be virtually unlimited in size.

In the...various functionalities.

In another embodiment, as will be described below with reference to the CMIDS 640 illustrated in Figure 10, the data processing components for **business** SUBSTITUTE SHEET (RULE 26) and data logic, i.e., the proxy server and the database resides with the CMIDS 640, thereby reducing the functions of...

...to an application server providing primarily state and session management. Porting the proxy server 670 over to the CMIDS 640 may be easily performed. The **transaction** handier in the middle tier, i.e., the message manager 656 still passes messages between the Web client 630 and the CMIDS 640. The only change needed is that the **transaction** handler connects to the proxy residing on the CMIDS 640, as opposed to the proxy 670 on the web server 632.

The proxy server 670 generally processes message **transactions** from the client 630 and is multithreaded to handle multiple message

**transactions** simultaneously. The proxy server 670 is designed to process one type of message **transaction** or a set of message **transactions** . In this embodiment, routing of the messages to and from the proxy is handled by the message manager 656. The proxy server 670 also interacts...

...needed to translate the messages to and from the SCP 610. A message translation program written in 4GL accesses the database 672 when a message **transaction** is received. The program translates the message and sends the message to the SCP 610 for processing. After the message has been processed, the program...

...response and sends it back to the message manager 656. The proxy server 670 typically invokes an instance of the translation program for each message **transaction** it receives and processes. As noted above with reference to the proxy server, the database 672 may also alternately reside in the CMIDS with the...the client sessions. As described above, the proxy server 670 generally handles webstation client 630 requests passed from the web servers 632 by accepting message **transactions** from the webstation client 630 via the web servers 632, maintains logging information, sends the request to a session manager 658, and receives data from...

...the networkMCI Interact StarOE authentication and entitlement system during the session log on.

The CMIDS 640 also may include a routing engine formatter, a CMIDS **transaction** manager, and a routing engine port manager. The session manager 658 SUBSTITUTE SHEET (RULE 26) typically passes-a **transaction** request received from the web server 632 to either the routing engine host formatter, or the CMID **transaction** manager. The routing engine host formatter module services **transactions** requiring SCP services to fulfill the request. The **transactions** originating from a webstation client 630, are translated to a correct MML format and sent to the routing engine port manager component.

The CMIDS **transaction** manager module services **transactions** that do not require the routing engine, e.g., SCP 610, i.e., the types of client request which may be serviced locally on CMIDS...

...an MML command is sent and a response is received, the session is returned to the session pool and freed for use by the succeeding **transactions** . A session pool is defined as a set of sessions connected to one particular SCP 610. Therefore, the routing engine port manager component of CMIDS...destination id "Orlando Central" to the network, which routes the call to the ACD via the Orlando Central destination id or trunk.

Call manager client GUI application implementation As described previously, the call manager client software uses the networkMCI Interact common objects (CO). Generally, the CO includes a library of objects...

...views of a data model. The model is a wrapper for an application data object. A controller is a lightweight event handling class, which translates GUI events into commands for the application. The view is

one particular **GUI** representation of the model. In a MVC typical operation, views register with a model, allowing the updating of multiple views when the model changes.

Each view has a controller, which handles the **GUI** events, and translates them into command descriptions.

The model stores command descriptions, which for example, enables the undo and redo functionality in the application.

The...in a similar manner as the first embodiment described above. The call manager client application downloaded from the server includes a CMBackPlane class which is **applet** derived from the COBackPlane class and which inherits the attributes of the COBackPlane class.

The CMBackPlane is launched with the call manager webstation web page...

...webstation application allows authorized customers to manage their ACD data networks via a web-based interface. Specifically, customers are enabled to provision hierarchies for their **business** ; control all routing of their toll-free traffic; create, modify or delete agent pools; manipulate capacity tables; and define quota schemes, value lists and schedule...

...then presented with a networkMCI Interact log on screen where the customer types in a name and password pair. At step 806, the log on **applet** associated with the log on page typically checks the entered name and password. At step 808, if the log on SUBSTITUTE SHEET (RULE 26) name and password is determined to be invalid, the customer is prompted to reenter the log on **transaction** at step 804. If the log on **transaction** is valid, the customer is presented with the networkMCI Interact home page (Figure 4) downloaded from the web **server** . with downloading and presenting of the home page, the web browser at the webstation 630, deploys a backplane **applet** via which the call manager client **GUI** application may be invoked.

As described in reference to Figures 3 and 4, the application backplane is a Java® applet invoked inside the networkMCI Interact's home page and is the conduit through which all other client applications may be deployed, including the call manager webstation **GUI** client application. At step 810, the backplane requests a list of authorized applications from the StarOE authentication and entitlement system for the networkMCI Interact platform...

...a call manager webstation session begins when a customer clicks on the call manager icon, triggering the backplane to launch the call manager webstation client **GUI** application.

At step 816, the customer is then presented with a call manager webstation application log on dialog,- on which the customer enters the call...

...SQL routine retrieves the available SCP. The proxy residing at the back-end returns a list of the available SCP to the front-end web **GUI** client application. The proxy generally maintains a "routing engine" list having SCP names and their IP addresses.

Maintaining the list of routing engine names on the proxy allows for easy modification of routing engine names and IP addresses with no impact to the client code.

When the front-end web **GUI** client application receives the list, a list of routing engine names may be displayed in a drop-down list for the customer to select, or the customer may be prompted for the SCP desired. The selected routing engine name is sent along with a log in **transaction** having user name/password to the back-end, when the customer clicks a "log in" button from the log in dialog. The "establish-session" command ...server or the proxy as described with reference to their functionalities above. At step 822, if the log on is valid, the call manager webstation **applet** is downloaded to the customer webstation 630, and at step 824, the customer is presented with the screen 870 shown in Figure 13 through which the customer may perform the call manager features of the present invention provided. These features include: manipulating user and **business** hierarchy by querying, creating, or editing user id records as shown at steps 826 and 828; managing routing schemes via the call by call application...  
...at step 833; and retrieving on-line help at step 835.

More specifically, by selecting the option at step 826, to manage a user and **business** hierarchy, via, e.g., the security button 882 (Figure 13) from the toolbar 880 (Figure 13), a customer may search for a user id and, with appropriate privileges, create or edit a user id for a **business** level below their own.

Through this option the customer may also access reporting visibility to all data items belonging to the customer and any **business** level below their own. In addition, the customer may assign a read, read/write, SUBSTITUTE SHEET (RULE 26) or no access privileges to each function in the user id profile. More over, the customers may administer and modify limits on the number of entities that a **business** unit may own in the provisioning database.

By selecting the call by call application at step 830, for example, by clicking on an icon labeled "Provisioning" (Figure 13 at 874) on the call manager web station tool bar displayed on the screen 870 in Figure 13, the customer may perform **business** hierarchy provisioning as shown at step 832a. The customer may select the option at step 832b and perform load balancing by determining the degree of...either a tape or a disk, a user may select a "Backup" option from the administration button menu and invoke the backup functionality. The client **GUI** application sends a "RTRV-BK-STATUS" message to check the status of the back-end. If a return message is not "INPROGRESS", a dialog box...

...ACD collectors. When this option is selected, a dialog 980 shown in Figure 15 opens with a list of retrieved gateway types. Typically the

client **GUI** application sends two messages to retrieve information needed to populate the dialog box 980. A "rtrv-acd-type" is used to fill the gateway type...that are common to SUBSTITUTE SHEET (RULE 26) many of the functional areas. For example, strings such as "OK", "Cancel" which are used throughout the **GUI** , are typically placed in the global list. The class naming convention is "CMXXXStrings" 1044, where IIXXXXII represents the functional area, such as rules, GDD, NEMS...

Claim

... client workstation for enabling interactive web-based 7 communications with the call manager webstation system 8 and providing the integrated interface; 9 at least one **secure server** for managing one or more customer session(s) over the Internet, the 11 **secure server** supporting a secure socket connection 12 enabling encrypted communications between the client 13 browser application and the **secure server** ; 14- configuring device launched via the client browser, for enabling a customer to monitor, define, 16 and manipulate call routing parameters, the configuring 17 device further formatting customer defined parameters 18 into client message **transactions** and communicating the 19 client message **transactions** to the **secure server** over the secure socket connection; 21 a routing engine for maintaining call routing 22 rules and interfacing with a plurality of network 23 control elements...

...call manager webstation 2 system as claimed in claim 1, wherein the system 3 further includes a proxy server for processing a 4 plurality of **transaction** requests received from the configuring device via the **secure server** by opening a 6 connection to the routing engine and retrieving 7 information relating to the **transaction** requests and 8- forwarding back the information to the configuring 9 device via the **secure server** , and wherein the configuring device presents the information to the 11 customer at the client workstation.

1 3. The web-based call manager webstation 2...

...the plurality of network control elements, said one or 6 more databases residing with the proxy server, the 7 proxy server further processing predetermined 8 **transaction** requests locally by retrieving information 9 related to the **transaction** requests from said one or more database(s), and forwarding the information to the 11 configuring device.

1 4. The web-based call manager webstation 2 system as claimed in claim 1, wherein the **secure server** 3 further includes:

4 a session manager for maintaining session information associated with the customer session, 6- the session information including a session 7 timestamp representing a time of receipt of a previous 8 communication **transaction** associated with the customer 9 session, SUBSTITUTE SHEET (RULE 26) I wherein-the session manager updates the 2 session timestamp with a current time when the secure 3 server receives a current communication **transaction** 4 from the configuring device.

1 5. The web-based call manager webstation 2 system as claimed in claim 4, wherein the **secure server** 3 further includes a device for monitoring the session 4 timestamp, and wherein if a time difference

between a current monitoring time and the session...1 36. The web-based call manager webstation 2 system as claimed in claim 35, wherein the parameters 3 affecting authentication and entitlements include 4 **business** hierarchies representing corporations and account groups.

1 37. The web-based call manager webstation 2 system as claimed in claim 35, wherein the parameters 3...

...enables the customer to view near real-time 4 displays of peg counts based on routing rules, the SUBSTITUTE SHEET (RULE 26) 1 plurality of **transaction** requests including a request 2 to monitor the peg counts, and the information includes 3 current peg counts retrieved and forwarded to the 4 customer...

...claim 2, wherein the system 3 further enables the customer to view near real-time 4 displays of call center ACD statistics, the plurality of **transaction** requests including a request to monitor 6 the call center ACD statistics, and the information 7 includes current call center ACD statistics retrieved 8 and...based communications between the customer and the integrated 6 interface, the method comprising:

7. managing a client session over the Internet 8 by providing a **secure server** which supports a secure SUBSTITUTE SHEET (RULE 26) 1 socket connection to enable encrypted communications 2 between the client browser application and the secure 3...

...55. The method according to claim 54,  
2 wherein the method further comprises:

3 downloading the data statistics to the 4 customer workstation via the **secure server** ; and presenting the data statistics to the 6 customer; 7 wherein the customer is enabled to monitor 8 status of the network control elements at...2 wherein the method further includes:

3 enabling the customer to write call routing 4 rules; and communicating the call routing rules via the 6 **secure server** ; 7 using the call routing rules for the call 8 routing of individual calls.

1 60. The method according to claim 59,  
2 wherein the...

...parameters which are used SUBSTITUTE SHEET (RULE 26) 1 to simulate the call scenarios; 2 communicating the customer-defined call 3 context parameters via the **secure server** ; and 4 using the customer-defined call context parameters in simulating the call scenarios, 6 wherein, the customer is enabled to control a 7 simulation...

...associated with the client session; 6 including a timestamp in the session 7 information for representing a time of receiving of a 8 previous communication **transaction** associated with the 9 client session; SUBSTITUTE SHEET (RULE 26) 1 receiving a current communication **transaction** 2 from the customer workstation; 3 updating the timestamp with a time of receipt 4 of the current communication **transaction** .

1 65. The method according to claim 64,  
2 wherein the step of managing a client session further 3 comprises:

4 monitoring the timestamp;  
comparing...a 6- client workstation for enabling interactive web-based  
SUBSTITUTE SHEET (RULE 26) I communications with the call manager  
webstation system; 2 at least one **secure server** for managing one 3 or  
more customer session(s) over the Internet, the 4 **secure server**  
supporting a secure socket connection enabling encrypted communications  
between the client 6- browser application and the **secure server** ; 7  
configuring device launched via the client 8 browser, for enabling a  
customer to monitor, define, 9 and manipulate call routing parameters,  
the configuring device further formatting customer defined parameters 11  
into client message **transactions** and communicating the 12 client  
message **transactions** to the **secure server** over 13 the secure socket  
connection; 14 a routing engine for maintaining call routing rules and  
interfacing with a plurality of network 16 control elements...

**5/3,K/4 (Item 4 from file: 349)**

DIALOG(R) File 349:PCT Fulltext  
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*Same provisions.*

00632949 \*\*Image available\*\*

**INTEGRATED PROXY INTERFACE FOR WEB BASED DATA MANAGEMENT REPORTS**  
**INTERFACE MANDATAIRE INTEGRE POUR RAPPORTS DE GESTION DE DONNEES BASEE SUR**  
**LE WEB**

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Detailed Description

Claims

English Abstract

An Intranet/Internet/Web-based data management tool that provides a

common **GUI** enabling the requesting, customizing, scheduling and viewing of various types of priced call detail data reports pertaining to a customer's usage of telecommunications services...

...application integrated with an operational data management/storage infrastructure that enables customers to access their own relevant data information timely, rapidly and accurately through the **GUI** client interface. The data management system infrastructure is designed to enable the secure initiation, acquisition, and presentation of telecommunications priced call detail data reports to...

#### Detailed Description

... WEB BASED DATA

#### MANAGEMENT REPORTS

The present invention relates generally to information delivery systems and, particularly, to a novel, World Wide Web/Internet-based, telecommunications **network** data **management** reporting and presentation service for customers of telecommunications service entities.

Telecommunications service entities, e.g., MCI, AT&T, Sprint, and the like, presently provide for the presentation and dissemination of customer account and **network** data **management** information to their customers predominantly by enabling customers (clients) to directly dial-up, e.g., via a modem, to the entity's application servers to...

...analyzed to determine, for example, .1 SUBSTITUTE SHEET (RULE 26) asset usage and trend information necessary, which is required for network managers to make critical **business** decisions. As an example, the assignee telecommunications carrier MCI Corporation provides an MCI ServiceView ("MSVII) product line for its **business** customers which includes several client-server based data management applications. One of these applications, referred to as "Perspective", provides call usage and analysis information that...

...midrange-based server data delivery mechanism with the data being typically delivered on a monthly basis, allowing for "delayed" trending, call pattern analysis, repricing and **invoice** validation based on the customer's call detail data.

The trending, analysis, and repricing functionality is maintained in workstation-based software provided to customers for...of customers who, to remain competitive, are required to have updated and real-time access to their data to enable them to make their critical **business** decisions quicker. Moreover, there are a variety of independent data management tools and legacy reporting systems having disparate systems and infrastructures providing little or no...

...computer terminal anywhere in the world.

The present invention is directed to a novel IIIntranet/Internet/Web-based data management tool that provides a common **GUI** enabling the requesting, customizing, scheduling and viewing of various types of priced call detail data reports pertaining to a

customer's usage of telecommunications services...  
...data management/storage infrastructure that enables customers to access their own relevant data information timely, rapidly and accurately through

-6 SUBSTITUTE SHEET (RULE 26) the **GUI** client interface. The operational database system infrastructure particularly is configured to meet a customer's real-time data processing and storage requirements and is easy information. The world wide web/Internet-based client-server data management and reporting tool employs a platform-independent, i.e., JAVA-based, network centric **GUI** client presentation layer and an objects/dispatcher/proxy layer access architecture.

Particularly, the telecommunications data management/system architecture is integrated with a novel Web/Internet...

...to schedule and prioritize reports, format report request result sets, and provides for load balancing, report request validation, query generation and execution.

Through a common **GUI** , customers are enabled to access their own metered data, i.e., Perspective or usage analysis data.

In accordance with the principles of the present invention...

...for enabling interactive Web based communications with the reporting system, the client terminal identified with a customer and providing the integrated interface; at least one **secure server** for managing client sessions over the Internet, the **secure server** supporting a first secure socket connection enabling encrypted communication between the browser application client and the **secure server** ; a dispatch server for communicating with the **secure server** through a firewall over a second socket connection, the first secure and second sockets forming a secure communications link, the dispatch server enabling forwarding of... networkMCI Interact system; Figure 4 is an illustrative example of a backplane architecture schematic; -10 SUBSTITUTE SHEET (RULE 26) Figure 5 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 6 is a diagram depicting the physical networkMCI Interact system architecture; Figure 7 isThe present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm. Known as the networkMCI Interact system ("nMCI Interact") such an integrated suite of Web based applications provides...

...resident on a customer work station and provides customer access to the enterprise system, having one or more downloadable application objects directed to front end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer requested...

...customer workstation  
includes client software capable of providing a platform-independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain

abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the applet classes free **network management** or Call Manager functions. The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 3 is a diagrammatic overview...

...applications generally are integrated using a "backplane" services layer 52 which provides a set of services to the application objects which provide the front end **business** logic and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as: 1...

...3) inter-application communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include: graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 4 is a diagrammatic example...

...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 5 illustrates an example client

**GUI** presented to the client/customer as a browser web page 71 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor 72; an alarm monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also...

...and a Message Center 77 for providing enhancements and functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a SUBSTITUTE SHEET (RULE 26) single object, COBackPlane which keeps track of all the client applications, and which has capabilities...Figure 3, it is understood that each Intranet server of suite 60 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 80(a). Such **network management** and customer network data is SUBSTITUTE SHEET (RULE 26) additionally accessible by authorized MCI management personnel. As shown in Figure 3, other legacy platforms 80(b), 80(c) and 80(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 80(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk

transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 60 quickly. Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported

generally for situations in which there may be a long delay in application server 60 response.

Specifically, a proxy will accept a request...

...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 60 and Legacy Mainframe Systems 80 which comprise the back end **business** logic applications.

As illustrated in Figure 6, the present invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between two...reports, such as provided by MCI's StarODS Server 63 in a variety of user selected formats.

All reporting is provided through a Report Requestor **GUI** application interface which support spreadsheet, a variety of graph and chart types, or both simultaneously. For example, the spreadsheet presentation allows for sorting by any...

...the inbox when a report is selected.

A common database may be maintained to hold the common configuration data which can be used by the **GUI** applications and by the mid-range servers. Such common data will include but not be limited to: customer security profiles, billing hierarchies for each customer...

...actual identified sender. one technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** .

Another component of the nMCI Interact infrastructure includes order entry, which is supported by the Order Entry ("StarOEII) server.

The general categories of features to...this WWW/Internet Reporting System 200, as shown in Figure 7, comprises the following components and messaging interfaces:

1) those components associated with the Client **GUI** front end including a report requestor SUBSTITUTE SHEET (RULE 26) client application 212, a report viewer client application 215 and, an Inbox client application 210...reports. In the preferred embodiment, the RM SUBSTITUTE SHEET (RULE 26) server 250 employs a Unix daemon that passively listens for connect requests from the **GUI** client applications and other back-end servers and deploys the TCP/IP protocol to receive and route requests and their responses. Particularly, Unix stream sockets using...

...into a "metadataall" format and are validated by a parser object built into a report manager proxy 2501 that services requests that arrive from the **GUI** front-end. If the errors are found in the metadata input, the RM 250 returns an error message to the requesting client. If the metadata ...

...middle-tier and back-end legacy systems including, e.g., TrafficView, Broadband, Service Inquiry, etc. in order to present to a customer these types of **network management** data.

The report manager server additionally utilizes a database 258, such as provided by Informix, to provide accounting of metadata and user report inventory. Preferably...9 and X=0-9), and Country Code.

A common database is maintained to hold the common configuration data which can be used by the **GUI** applications and by the mid-range servers.

Such common data will include but not be limited to: customer security profiles, billing hierarchies for each customer, general reference data (states, NPAs, Country codes), and customer specific pick lists: e.g., ANIs, calling cards, etc with regard to the front-end client **GUI** components, the above-mentioned Inbox client application 210 functions as an interface between the client software and the Inbox server 270 for presenting to the...

...a new connection when a new message was detected. In this way, multiple messages may be downloaded simultaneously.

The Report Requester application 212 is a **GUI Applet** enabling user interaction for managing reports and particularly includes processes supporting: the creation, deletion, and editing of the user's reports; the retrieval and display...herein, the report scheduler service maintains a list of requested reports for a given user, and forward actual report requests to the appropriate middle tier **servers** at the appropriate time. Additional functionality is provided to enable customers to manage their inventory, e.g., reschedule, change, or cancel (delete) report requests.

The Report Viewer application 215 is a **GUI Applet** enabling a user to analyze and display the data and reports supplied from the StarODS fulfilling system 400. Particularly, the Report Manager 250 includes...

...time of display, and what further customization options the user has while viewing the report. It additionally includes a common report view by executing a **GUI** applet that is used for the display and graphing of report data and particularly, is provided with spreadsheet management functionality that defines what **SUBSTITUTE SHEET**...

...messages telling it to display an image or text that may be passed by one of the applications in lieu of report data (e.g., **Invoice** ,

Broadband report, etc.) All reporting is provided through the Report Viewer interface which supports spreadsheet, a variety of graphic and chart types, or both types...data translations, data grouping, data routing, and data logging functions. According to a dimension table based on data within selected BDRs, the harvesting process applies **business** rules to the data, cleanses the data, transforms the data, creates load files for DataMarts and compresses files for storage in the DataMarts. The harvesting...is currently either 800 or 888; a Product Type table 469 comprising data indicating the product for which-services are bundled for the purpose of **invoicing** ; a GMT table 471 comprising date and time data adjusted to the Greenwich Mean Time Zone; a LST table 473 comprising date and time data...Support Server ("DSS") SUBSTITUTE SHEET (RULE 26) reporting engine component 475 that performs the following functions: 1) receives various customer report requests from the StarWRS **GUI** Report Requestor component and accordingly generates database queries; 2) routes the query to the appropriate data marts 470, data warehouse or operational data store; and, 3) responds to the requestor with a formatted result set. The DSS server 475 may also perform cost estimation, agent scheduling, workflow broadcasting interface, and **transaction** logging functions. In the preferred embodiment, the DSS 475 is a cluster of DEC (Digital Equipment Corp.) UNIX 8400 servers running Information Advantage0 software accessing...on a known TCP port. The StarOE server acts as a proxy when messages are sent from the Dispatcher W server 46 and supports synchronous **transactions** .

All data and security information is accessed by direct queries to a StarOE server database 283, such as provided by Informix. Once a user is ...  
...the user and which determines which buttons on the home page are active, thus controlling their access to products.

This information is downloaded by a **GUI** applet that is executed via the Backplane (Figure 4) and incorporated into the home page that is presented to the user. An exemplary home page...editing an existing report. From this screen and related report building dialog boxes, all of the initial values for retrieving the MetaData, customization options and **GUI** builder options from the report manager server 250 necessary to build (edit) a report are provided in accordance with the user's entitlements. A user...communication with the backend; and, 3) a WRSReportManagerUtilParser to format the data returned. In response, the Report Manager creates a Dispatcher object, which contains the **business** logic for handling metadata messages at the back-end and utilizes the services of a RMParse class.

Upon determining that the client has sent a...The parser returns a hash table containing the User Report List. At the RM server, the Report Manager creates an Dispatcher object that contains the **business** logic for handling metadata messages at the back-end and utilizes the services of the RMParse class. Upon determining that the client has sent a...extracted from the node and used to construct the screen related to the node. The Report Manager server creates the MCIDispatcher object which contains the **business** logic for handling metadata messages at the back-end and utilizes the services of the RMParse class. Upon

determining that the client has sent a...the DMZ StarWeb Server(s) 44 to access the underlying message; a DMZ Web header 346 which is used to generate a cookie 341 and **transaction** type identifier 343 for managing the client/server session; a dispatcher header 345 which includes the target proxy identifier 350 associated with the particular type of **transaction** requested; proxy specific data 355 including the application specific metadata utilized by the target proxy to form the particular messages for the particular middle tier...indicates the message type/mechanism 130 which may be one of four values indicating one of the following four message mechanisms and types: 1) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request, e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...

...RULE 26) status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction** . More complete error data will be included in the specific error message returned. The status field 140 is included to maintain consistency between requests and...The application proxy supports application specific translation and SUBSTITUTE SHEET (RULE 26) communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

Particularly, in performing the verification, translation and communication functions, the Report Manager server, the Report Scheduler server and Inbox server proxies each employ front...

...contains the data to store. After a message is received, the parser object is created in the RMDispatcher.c object which is file containing the **business** logic for handling metadata messages at the back-end. It uses the services of an RMParse class. Upon determining that the client has sent a...Report Location 9 bi NRL Request Char (3) PE= Designates Char (30) e.g. Broadband, report type, call priced, real-time, detail type, or exception, **invoice** , news type MIR, CCID, priced call detail, outage ENTPID= Enterprise ID Char (8) Yes Enterprise ID USERID= User's ID Char (20) Yes UserID STDRPTID...server is server in ARD. Limit using the on request ID is StarWRS 2147483647.

Report  
Request

PRIORITY= Standardized Char (1) ONLY 1 = fatal, 2 major, 3 **Network** news = minor, 4 **Management** info(default), 5 no Priority Levels alert  
COMPRESS Designates Char (1) Yes 0 = data not whether the data compressed, 1 has been data compressed ~TYPE...

...report, call Detail, F = News detail, or news TYPE= Designates Char (30) Yes e.g. Broadband, report type, call priced, unpriced, detail type, or exception, **invoice** , news type MIR, CCID, priced ca I detail, outage USERID= Designates Char (20) Yes Starbucks username intended as assigned in recipient or StarOE audience RPTID...40) yes String value of SHAnED, DIAL Access 1,CARD, DEDICATED ACCESS, 000 REMOTE ACCESS, DIRECT DIAL FAX CALLS, STOREIFFORWARD FAX CALL, CELLULAR, LOCAL, 800 **BUSINESS** LINE, 000

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**Invoice** recipient sorvico-loc-ld char(0) yes MCI Identifier for N0000001 physical location of a subscribed service ontorpriso-nama cliar(30) yes Customer name associated...No Date time stamp Prochict Coltrnn, 110mo Type Nulls Definition nange or example Value prochjclj(oy char(4) no Indicator specifying 0010, 0011, 0015 Or **Invoicin11** system 0010 prodtic1,-namo chir(30) no **Invoicing** system Vnet level smallint no Mechanism to (constrain parent.

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**Invoiced** for ilia call but does not own Ilia Oxx number non-cross  
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dedicated bill-pefiod smallint no The period the call 0197 Is **Invoiced**  
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shared or dodIcaled SUBSTITUTE SHEET (RULE 26) APPENDIX I The...

#### Claim

... 7 Web based communications with said reporting 8 system, said client workstation identified with a 9 customer and providing said integrated interface; at least one **secure server** for managing 11 client sessions over the Internet, said secure 12 server supporting a first secure socket connection 13 over a first firewall enabling encrypted 14 communication between said client browser application and said **secure server** ; 16 report manager server for maintaining an 17 inventory of reporting items 'associated with a 18 customer and managing the reporting of customer 19 specific...

...a response message including a 22 metadata description of said reporting items 23 included in a report request; 24 dispatch server for communicating with said **secure server** through a second firewall over a 26 second socket connection, said first secure and 27 second socket connections forming a secure 28 communications link, said...first secure 8 server over a first secure socket connection, said 9 socket connection enabling encrypted communication between said browser application client and said 11 **secure server** ; 12 enabling communications between said 13

**secure server** and a second server over a second 14 socket connection, said first and second sockets forming a secure communications link, said second 16 server enabling...

5/3,K/5 (Item 5 from file: 349)

DIALOG(R) File 349:PCT Fulltext  
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**DATA WAREHOUSING INFRASTRUCTURE FOR WEB BASED REPORTING TOOL**  
**INFRASTRUCTURE D'EMMAGASINAGE DE DONNEES POUR OUTIL D'ETABLISSEMENT DE**  
**RAPPORT BASE SUR LE WEB**

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Detailed Description

Claims

English Abstract

A data warehousing infrastructure for telecommunications priced call detail data is integrated with a Web/Internet based reporting system providing a common GUI enabling the requesting, customizing, scheduling

and viewing of various types of priced call detail data reports. Such an infrastructure performs an extraction process (500) to...

#### French Abstract

...d'appels tarifés de télécommunications est intégrée à un système d'établissement de rapport basé sur le WEB/l'Internet fournissant une interface utilisateur graphique ( **GUI** ) commune permettant la demande, la personnalisation, la planification et la visualisation de divers types de rapports de données de détails d'appels tarifés. Une telle...

#### Detailed Description

##### ... FOR WEB BASED REPORTING TOOL

The present invention relates generally to information delivery systems and, particularly, to a novel, World Wide Web/Internet-based, telecommunications **network data management** reporting and presentation service for customers of telecommunications service entities.

Telecommunications service entities, e.g., MCI, AT&T, Sprint, and the like, presently provide for the presentation and dissemination of customer account and **network data management** information to their customers predominantly by enabling customers (clients) to directly dial-up, e.g., via a modem, to the entity's application servers to...

...This type of data is analyzed to determine, for example, asset usage and trend information necessary, which is required for network managers to make critical **business** decisions. As an example, the assignee telecommunications carrier MCI Corporation provides an MCI ServiceView ("MSV") product line for its **business** customers which includes several client-server based data management applications. one of these applications, referred to as "Perspective," provides call usage and analysis information that...

...midrange-based server data delivery mechanism with the data being typically delivered on a monthly basis, allowing for "delayed" trending, call pattern analysis, repricing and **invoice** validation based on the customer's call detail data.

The trending, analysis, and repricing functionality is

maintained in workstation-based software provided to customers for... increasing number of customers who, to remain competitive, are required to have updated daily access to their data to enable them to make their critical **business** decisions quicker. Moreover, these legacy platforms including reporting data are reaching the architectural limits of scalability in terms of the total customers they can support...

...to schedule and prioritize reports, format report request result sets, and provides for load balancing, report request validation, query generation and execution.

Through a common **GUI** , customers are enabled to access their own billing call detail data.

In accordance with the principles of the invention, there is provided a

Web/Internet...an output fact table comprising customer records having the unique key structures for enabling consolidated storage of specific customer call detail data; at least one **secure server** for managing client sessions over the Internet, the **secure server** supporting secure communication of customer request messages between the browser application client and the **secure server** ; and, a device for receiving the customer requests from the **secure server** and generating corresponding database queries implementing the dimension keys for application against the output fact table to obtain a specific call customer's call detail data, the accessed call detail data being transmitted back to the client web browser via the **secure server** ; whereby expedient and updated web/Internet-based access to the customer's daily call detail data is assured.

Advantageously, the data warehousing infrastructure for the Figure 5 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 6 is a diagram depicting the physical networkMCI Interact system architecture; Figure 7 illustrates...

...the application specific proxy back to the Dispatcher server (Figure 18(b)).

The present invention is one component of an 50 integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system ("nMCI Interact") such an integrated suite of Web-based applications provides...

...or client tier of software services are resident on a customer work station and provides customer access to the enterprise system, having one or more **downloadable application** objects directed to front end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for ...in a manner such that multiple programs are combined in a unified application suite. A second or middle tier 42, is provided having secure web **servers** and back end services to provide applications 45 that establish user sessions, govern user authentication and their entitlements, and communicate with adaptor programs to simplify...

...customer workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or Call Manager functions.

The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 3 is a diagrammatic overview...

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Figure 5 illustrates an example client **GUI** presented to the client/customer as a browser web page 71 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor 72; an alarm monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also...

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As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to start, stop, and...Figure 3, it is

understood that each Intranet server of suite 60 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 80(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 3, other legacy platforms 80(b), 80(c) and 80(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 80(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted...

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Another component of the nMCI Interact infrastructure includes order entry, which is supported by the Order Entry ("StarOE") server. The general categories of features to...enabled) records from divisions or runstreams; and, b) a Harvesting component 600 including processes for creating dimension tables based on data within selected BDRs, applying **business** rules to the data, transforming the data into centralized fact table, creating load files for data marts, and compressing files for transmission; 5) Operational Data...

...formats query results into a format readable by Message Center viewers, transmits complete reports to directory, on Inbox server, and, additionally, performs cost estimation, scheduling, **transaction** logging and generates report metrics; and, 8) Talarian Smart Sockets ...call amount, duration and count, for a customer may match to within 5 per cent variance, of their corresponding monthly data that is used for **invoicing** .

Figure 8 illustrates a detailed overview of the extracting process 500 of the StarODS CDG component 430 of the data warehousing infrastructure of

the invention...valid values and invalid fields of any records may be blocked out based upon pre-determined criteria. Additionally input to the BDR record is an **invoicing** period value, e.g., "bill-period" which may be used as a text tag, to 45 facilitate the above-mentioned monthly replace operation. More particularly, BDR records are rearranged so that the Corp ID, Service ID, **Invoicing** Period, Call Minutes and Call Amount are the first five fields of each record. Output BDR records are 50 adjusted to have a structure and...Billing Detail Records (BDRs) for those entitled NMCI Interact/ODS customers, 50 and Data Harvesting transforms the Billing Detail Records based on a set of **business** rules applied to the call data. The final result of harvesting is call detail data ready to be loaded into the ODS data marts for...800# or 888# (in the USA); a Product Type table 769 comprising data indicating the product for which services are bundled for the purpose of **invoicing** ; a GMT table 771 comprising date and time data adjusted to the Greenwich Mean Time Zone; a LST table 773 comprising date and time data...updated, and are hence referred to as static dimensions. The Access Type and Product Type Dimensions are updated or added to only as new 45 **business** requirements are brought to light. For example, the Access Type Dimension is updated only if new access types are created or added and, the Product ...basic process logic is similar for all products regardless of whether it involves daily or monthly data harvesting, different dimensional processing as well as distinct **business** rules implementation are associated with each distinct product. As such, distinct data harvesting program modules are implemented for each of the following: Daily data; Monthly...are performed to write a billing dimension key to the (FACT) record, or to add a record to each dynamic dimension table: first the following **business** rules are applied to the BILLING Dimension Table: 1) Moving STK-ENT-ID-CD to BILLING KEY CORP; 2) moving STK-BILL ID to BILLING...the datacenter in the appropriate ASCII file format. Furthermore, loading of a given monthly divisional/runstream harvested data file is triggered by the corresponding formal **invoicing** approval for that division or runstream.

Appendix I is a listing in DDL representing the star topology organization of the fact tables, dimension tables, and mart by executing a replace operation of all daily records for that product, **invoice** period and day with their equivalent records from the monthly file. Granularity of the replace operation is on a daily level, i.e., daily blocks of BDR's are replaced, not individual BDR's. Completion of entire monthly replace operation for specific **invoice** period and product triggers the DSS server to begin running monthly reports which have been queued up.

It should be understood, that the monthly replace...component 475 that performs the following functions: 1) receives data access requests from various users in the form of a report request from the StarWRS GUI Report Requestor component; 2) routes the query to the appropriate data marts 470, data warehouse or operational data store; and, 3) responds to the requestor with the result set. The DSS server 475 may also perform cost estimation, agent scheduling, workflow broadcasting interface, and **transaction** logging functions. In the preferred embodiment, the DSS 475 is a cluster of DEC (Digital Equipment Corp.) UNIX 8400 servers running

Information Advantageo software accessing...WWW/Internet Reporting System 200, as shown in Figure 12, comprises 50 the following components and messaging interfaces:

1) those components associated with the Client **GUI** front end including a report requestor client application 212, a report viewer client application 215 and, an Inbox client application 210 which implement the logical...

...metadata used for displaying reports. In the preferred embodiment, the RM server 250 employs a Unix daemon that passively listens for connect requests from the **GUI** client applications and other back-end servers and deploys the TCP/IP protocol to receive and route requests and their responses. Particularly, Unix stream sockets...

...a I'metadatall format and are validated by a parser object built into a report manager proxy 250, that services requests that arrive from the **GUI** front-end.

50 If the errors are found in the metadata input, the RM 250 will return an error message to the requesting client. If...that the RM 250 server may manage reporting data for customer presentation from other back-end and legacy servers including, e.g., Broadband, Toll Free **Network Management**, and Event Monitor servers, etc. in order to present to a customer these types of billing/management data.

The report manager server additionally utilizes a...Numbering Plan Area (NPA), NXX (Exchange code where N=2-9 and X=0-9), and Country Code.

With regard to the front-end client **GUI** components, the above-mentioned Inbox client application 210 functions as an interface between the client software and the Inbox server 270 for presenting to the...new connection when a new message was 50 detected. In this way, multiple messages may be downloaded simultaneously.

. The Report Requestor application 212 is a **GUI Applet** enabling user interaction for managing reports and particularly includes processes supporting: the creation, deletion, and editing of the user's reports; the retrieval and display...

...herein, the report scheduler service maintains a list of requested reports for a given user, and forward actual report requests to the appropriate middle-tier **servers** at the appropriate time. Additional functionality is provided to enable customers to manage there inventory, e.g., reschedule, change, or cancel (delete) report requests.

The Report Viewer application 215 is a **GUI Applet** enabling a user to analyze and display the data and reports supplied from the fulfilling **servers** such as StarODS 400, Traffic View ("TVS") 500, and other systems such as Broadband and toll free network manager. Particularly, the Report Manager 250 includes...

...time of display, and what further customization options the user has while viewing the report. It additionally includes a common report view by executing a **GUI applet** that is used for the display and graphing of report data and particularly, ...messages telling it to display an image or text that may be passed by one of the applications in lieu of report data (e.g., **Invoice** , Broadband report, etc.) All reporting is provided through the Report Viewer interface which supports spreadsheet, a variety of graphic and chart types, or both types...listening on a known TCP port. The StarOE server acts as a proxy when messages are sent from the Dispatcher server 46 and supports synchronous **transactions** . All data and security information is accessed by direct queries to a StarOE server database 283, such as provided by Informix. Once a user is ...e., services, for the user and which determines which buttons on the home page are active, thus controlling their access to products. This information is **downloaded** by a **GUI applet** that is executed via the Backplane (Figure 4) and incorporated into the home page that is presented to the user. An exemplary home page screen...editing an existing report. From this screen and related report building dialog boxes, all of the initial values for retrieving the MetaData, customization options and **GUI** builder options from the report manager server 250 necessary to build (edit) a report are provided in accordance with the user's entitlements. A user...communication with the backend; and, 3) a WRSReportManagerUtilParser to format the data returned. In response, the Report Manager creates a Dispatcher object, which contains the **business** logic for handling metadata messages at the back-end and utilizes the services of a RMParse class. Upon determining that the client has sent a...The parser returns a hash table containing the User Report List. At the RM server, the Report Manager creates an Dispatcher object that contains the **business** logic for handling metadata messages at the back-end and utilizes the services of the RMParse class. Upon determining that the client has sent a...extracted from the node and used to construct the screen related to the node. The Report Manager server creates the MCIDispatcher object which contains the **business** logic for handling metadata messages at the back-end and utilizes the services of the RMParse class. Upon determining that the client has sent a...the DMZ StarWeb Server(s) 44 to access the underlying message; a DMZ Web header 346 which is used to generate a cookie 341 and **transaction** type identifier 343 for managing the client/server session; a dispatcher header 345 which includes the target proxy identifier 350 associated with the particular type of **transaction** requested; proxy specific data 355 including the application specific metadata utilized by the target proxy to form the particular messages for the particular middle tier... indicates the message type/mechanism 130 which may be one of four values indicating one of the following four message mechanisms and types: I) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request, e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...

...indicates the status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction** . More complete error data will be included in the specific error message returned. The status field 140 is included to maintain consistency between requests and...get the request serviced. The

application proxy supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

Particularly, in performing the verification, translation and communication functions, the Report Manager server, the Report Scheduler server and Inbox server proxies each employ front...  
...contains the data to store. After a message is received, the parser object is created in the RMDispatcher.c object which is file containing the **business** logic for handling metadata messages at the back-end. It uses the services of an RMParse class. Upon determining that the client has sent a...

#### Claim

... table 23 comprising customer records having said unique key 24 structures for enabling consolidated storage of specific customer call detail data; 26 at least one **secure server** for managing 27 client sessions over the Internet, the secure 28 server supporting secure communication of customer 29 request messages between the browser application client and the **secure server** ; and, 31 device for receiving said customer requests 32 from said **secure server** and generating 33 corresponding database queries implementing said 34 dimension keys for application against said output fact table to obtain a specific call customer's 36 call detail data, said accessed call detail data 37 being transmitted back to said client web browser 38 via said **secure server** ; 39 whereby expedient and updated web/Internet based access to said customer's daily call detail 41 data is assured.

2. The system as claimed...associated with a particular calling area.

1 10. The system as claimed in Claim 5, further 2 including dispatch server for communicating with 3 said **secure server** through a firewall over a 4 second socket connection, the first and second secure sockets forming a secure communications 6 link, said dispatch server enabling... fact table comprising customer records having said unique key structures 21 for enabling consolidated storage of specific 22 customer call detail data; 23 implementing a **secure server** to manage client 24 sessions over the Internet, the **secure server** supporting secure communication of customer 26 request messages between the browser application 27 client and the **secure server** ; and, 28 receiving said customer requests from said 29 **secure server** and generating corresponding database queries implementing said dimension keys 31 for application against said output fact table to 32 obtain a specific customer's call detail data, 33 said accessed call detail data being transmitted 34 back to said client web browser via said **secure server** , 36 whereby expedient and updated web/Internet 37 based access to said customer's daily call detail 38 data is assured.

1 17. The method...Report Location

NRL Request har (3) Yes

TYPE= Designates har (30) Yes e.g. Broadband, report type, call priced, real-time, detail type, or exception, **invoice** , news type MIR, CCID,

priced call detail, outage ENTPID= Enterprise ID Char (8) Yes Enterprise ID USERID= User's ID Char (20) Yes UserID...

...server is server In ARD. Limit using the on request ID Is StarWRS 2147483647.

Report

Requeste

PRIORITY= Standardized Char (1) ONLY 1 = fatal, 2 major, 3 **Network** news = minor, 4 **Management** info(default), 5 no Priority Levels alert  
COMPRESS Designates Char (1) Yes 0 = data not whether the data compressed, 1 has been data compressed compressed...report, call Detail, F = News detail, or news TYPE= Designates Char (30) Yes e.g. Broadband, report type, call priced, unpriced, detail type, or exception, **invoice**, news type MIR, CCID, priced call detail, outage USERID= Designates Char (20) Yes Starbucks username intended as assigned in recipient or StarOE audience RPTID= User...String value of SHARED, DIAL Access 1,CARD, DEDICATED ACCESS, 800 REMOTE ACCESS, Q~RECT DIAL FAX CALLS, STORE/FORWARD FAX CALL, CELLULAR, LOCAL, 800 **BUSINESS** LINE, 800 WATTS LINE, 800 DEDICATED LINE or 800 INTERSWITCH NETWORK CALL REDIRECT/DTO a%---long-idesc char(50) yes A long textual Not currently...

...a 00000001 grouping of Corp Ids corporate~jd char(S) no MCI identifier for 99999999 Customer billing-id char(B) yes MCI identifier for Y0000001 **invoice** recipient service-loc-id char(B) yes MCI Identifier for N0000001 physical location of a subscribed service enterpriseLname char(30) yes Customer name associated with...time stamp Product 'Column Name 7 pe !~:.Nulls Definition Range or example :,qlva ue product-key char(4) no: Indicator specifying 0010, 0011, 0015 Or **invoicing** system 0018 product name char(3Q) no **Invoicing** system V'ret level smallint no Mechanism to (constrain parent, child, attribute relationships & provide for filtering (mandated by use of I DeclslonSuite) product-abv char...s Definition ange or examp e.

.---il~.'iColumn Nlame T e  
currency-cd char(3) no Specifies the type of USA currency the call Is **invoiced** In ~~re-ncy--0esc char(20) no Unique description I I of currency~~qd i "I ( Currency , 4 -e ame F--.ti\*'CdIumn N \*'Definition... call cross-corp-ind char(1) yes Indicator specifying 0, T or L if the 8xx number terminated at a corp-id that will be **Invoiced** for the call but does not own the Bxx number non-cross,..-corp-ld char(8) yes Corp Id of Customer 99111111 owning an 8xx number but which will not be **invoiced** for the call enhance-call-ne char(1) yes Indicator specifying the type of Enhanced Call Routing Feature or Annswernet feature realtime-ani char(1 ...Access & 11, 12, 21 or 22 termination indicator, speciifes if call was shared or dedicated bill-period smallint no The period the call 0197 is **invoiced** in axs--Jerrn-cd char(2) no Indicator specifying 11, 12, 21 or 22 Either shared or dedicated ( U-) APPENDIX I grant dba to "informix...

5/3,K/6. (Item 6 from file: 349)

DIALOG(R) File 349:PCT Fulltext

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00632946

**INTEGRATED PROXY INTERFACE FOR WEB BASED DATA MANAGEMENT REPORTS**  
**INTERFACE MANDATAIRE INTEGREE POUR RAPPORTS DE GESTION DE DONNEES SUR LE**  
**WEB**

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Detailed Description

Claims

**English Abstract**

An Intranet/Internet/Web-based data management tool that provides a common **GUI** enabling the requesting, customizing, scheduling and viewing of various types of unpriced call detail data reports pertaining to a customer's telecommunications network traffic. The...

...comprises a novel Web- based, client-server application that enables customers to access their own relevant data information timely, rapidly and accurately through a client **GUI** . A traffic view server is provided that enables periodic acquisition of data from the customer's telecommunications network at a user-specified frequency and configured

...

**Detailed Description**

... WEB BASED DATA MANAGEMENT REPORTS

The present invention relates generally to information delivery systems

and, particularly, to a novel, World Wide Web/Internet-based, telecommunications **network data management** reporting and presentation service for customers of telecommunications service entities.

Telecommunications service entities, e.g., MCI, AT&T, Sprint, and the like, presently provide for the presentation and dissemination of customer account and **network data management** information to their customers predominantly by enabling customers (clients) to directly dial-up, e.g., via a modem, to the entity's application servers to...

...s telecommunications traffic, i.e., number usage. This type of data is provided in near real-time, and is used by network managers to make **business** decisions regarding their telecommunications networks. As an example, the assignee telecommunications carrier MCI Corporation provides an MCI ServiceView ("MSV") product line for its **business** customers which includes several client-server based data management applications. One of these applications, referred to as "TrafficView", provides network traffic analysis/monitor information as...

...of customers who, to remain competitive, are required to have updated and real-time access to their data to enable them to make their critical **business** decisions quicker.

Moreover, there are a variety of independent data management tools and legacy reporting systems having disparate systems and infrastructures providing little or no...computer workstation anywhere in the world.

The present invention is directed to a novel Intranet/Internet/Web-based data management system that provides a common **GUI** enabling the requesting, customizing, scheduling and viewing of various types of reports pertaining to customer's telecommunications network traffic, i.e., unpriced "traffic view" data...

...that enables customers to access their own relevant unpriced network traffic data information timely, rapidly and in a secure manner through the a client 45 **GUI** . A client server application infrastructure enables processing, generation, and reporting of customer's real-time and rated inbound and outbound telecommunications traffic for **network management**, call center **management** and customer calling pattern 50 analysis functions.

The system further employs a platform independent, i.e., JAVA-based, network centric **GUI** client presentation layer and an objects/dispatcher/proxy layer access architecture.

Particularly, the telecommunications data management/system architecture is integrated with a novel Web/Internet...

...to schedule and prioritize reports, format report request result sets, and provides for load balancing, report request validation, query generation and execution. Through a common **GUI** , customers are enabled to access their own unmetered network traffic data, i.e., usage analysis data.

In accordance with the principles of the present invention...

...for enabling interactive Web based communications with the reporting system, the client workstation identified with a customer and providing the integrated interface; at least one **secure server** for managing client sessions over the Internet, the **secure server** supporting a secure socket connection enabling encrypted communication between the browser application client and the **secure server** ; a report manager server in communication with at least one **secure server** for maintaining an inventory of reporting items associated with a customer, the reporting items comprising report data types and ...the software architecture of the networkMCI Interact system; Figure 3 is an illustrative example of a backplane architecture schematic; Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 5 is a diagram depicting the physical networkMCI Interact system architecture; Figure 6 is...

...between the application specific proxy back to the Dispatcher server (Figure 14(b)).

The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system ("nMCI Interact") such an integrated suite of Web-based applications provides...on a customer work station 10 and provides customer access to the enterprise system, having one or more downloadable application objects directed to front end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer requested...

...customer workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain' abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or Call Manager functions.

The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview...generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects which provide the front end 45 **business** logic and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as:  
1...

...inter-application communications; 4) window navigation 50 among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 3 is a diagrammatic example...

...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 80 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor 72; an alarm monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to start, stop, and...Figure 2, it is

understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 40(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and (d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response.

Specifically, a proxy will accept a request...

...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 30 and Legacy Mainframe Systems 40 which comprise the back end **business** logic applications.

As illustrated in Figure 5, the present

invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between two...such as provided by MCI's StarODS Server 33 in a variety of user selected formats.

45 All reporting is provided through a Report Requestor **GUI** application interface which support spreadsheet, a variety of graph and chart type, or both simultaneously. For example, the spreadsheet presentation allows for sorting by any...

...actual identified sender. One technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** .

Another component of the nMCI Interact infrastructure includes order entry, which is supported by the Order Entry ("StarOE") server. The general categories of features to...this WWW/Internet Reporting System 200, as shown in Figure 6, comprises the following components and messaging interfaces:

1) those components associated with the Client **GUI** front end including a report requestor client application 212, a report viewer client application 215 and, an Inbox client application 210 which implement the logical...

...metadata used for displaying reports. In the preferred embodiment, the RM server 250 employs a Unix daemon that passively listens for connect requests from the **GUI** client applications and other back-end servers and deploys the TCP/IP protocol to receive and route requests and their responses. Particularly, Unix stream sockets...

...into a 'metadatall' format and validated by a parser object built into a report manager proxy 2501 that services requests that arrive from the **GUI** front-end. If the errors are found in ...that the RM 250 server can manage reporting data for customer presentation from other back-end and legacy servers including, e.g., Broadband, Toll Free **Network Management** , and Event Monitor servers, etc. in order to present to a customer these types of **network management** and reporting data.

The report manager server additionally utilizes a database 258, such as provided by Informix, to provide accounting of metadata and user report...e., Pick Lists) from StarOE server 285.

A common database may be maintained to hold the common configuration data which can be used by the **GUI** applications and by the mid-range servers. Such common data will include but not be limited to:

customer security profiles, billing hierarchies for each customer... cards, etc.. An MCI Internet StarOE server will manage the data base for the common configuration of data.

With regard to the front-end client **GUI** components, the above-mentioned Inbox client application 210 functions as

an interface between the client software and the Inbox server 270 for presenting to the...

...a new connection when a new message is detected. In this way, multiple messages may be downloaded simultaneously.

The Report Requestor application 212 is a **GUI Applet** enabling user interaction for managing reports and particularly includes processes supporting: the creation, deletion, and editing of the user's reports; the retrieval and display...

...herein, the report scheduler service maintains a list of requested reports for a given user, and forwards actual report requests to the appropriate middle-tier **servers** at the appropriate time. Additional functionality is provided to enable customers to manage their inventory, e.g., reschedule, change, or cancel (delete) report requests.

In...

...functionality, are downloaded to the customer's workstation in the form of a cab file after initial login.

The Report Viewer application 215 is a **GUI Applet** enabling a user to analyze and display the data and reports supplied from the fulfilling **servers** such 45 as StarODS 400, Traffic View ("TVS") 500, and other systems such as Broadband and toll free network manager. Particularly, the Report Manager 250...

...time of display, and what further customization options the user has while viewing the report. It additionally includes a common report view by executing a **GUI applet** that is used for the display and graphing of report data and particularly, is provided with spreadsheet management functionality that defines what operations can be...

...messages telling it to display an image or text that may be passed by one of the applications in lieu of report data (e.g., **Invoice** , Broadband report, etc.) All reporting is provided through the Report Viewer interface which supports text displays, a spreadsheet, a variety of graphic and chart types...the customer via the StarWRS Web Reporting System, and, supplies on-line customer access to call detail and hourly statistics that aid the customer in **Network management** , call center **management** and customer calling pattern analysis. For real time (unpriced) data, statistics are generated for the following totals: minutes, attempts, completes, incompletes, other, dto (direct termination ...listening on a known TCP port. The StarOE server acts as a proxy when messages are sent from the Dispatcher server 26 and supports synchronous **transactions** . All data and security information is accessed by direct queries to a StarOE server database 283, such as provided by Informix. Once a user is...

...e., services, for the user and which determines which buttons on the home page are active, thus controlling their access to products. This information is **downloaded** by a **GUI applet** that is executed via the Backplane (Figure 3) and incorporated into the home page that is

presented to the user as indicated at steps 612...editing an existing report. From this screen and related report building dialog boxes, all of the initial values for retrieving the MetaData, customization options and GUI builder options from the report manager server 250 necessary to build (edit) a report are provided in accordance with the user's entitlements. A user...communication with the backend; and, 3) a WRSReportManagerUtilParser to format the data returned. In response, the Report Manager creates a Dispatcher object, which contains the **business** logic for handling metadata messages at the back-end and 45 utilizes the services of a RMParse class. Upon determining that the client has sent ...The parser returns a hash table containing the User Report List. At the RM server, the Report Manager creates an Dispatcher object that contains the **business** logic for handling metadata messages at the back-end and utilizes the services of the RMParse class. Upon determining that the client has sent a...

...extracted from the node and used to construct the screen related to the node. The Report Manager server creates the MCIDispatcher object which contains the **business** logic for handling metadata messages at the back-end and utilizes the services of the RMParse class. Upon determining that the client has sent a...the DMZ SStarWeb Server(s) 24 to access the underlying message; a DMZ Web header 346 which is used to generate a cookie 341 and **transaction** type identifier 343 for managing the client/server session; a dispatcher header 345 which includes the target proxy identifier 350 associated with the particular type of **transaction** requested; proxy specific data 355 including the application specific metadata utilized by the target proxy to form the particular messages for the particular middle tier...indicates the message type/mechanism 130 which may be one of four values indicating one of the following four message mechanisms and types: 1) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request, e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...

...indicates the status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction** . More complete error data will be included in the specific error message returned. The status field 140 is included to maintain consistency between requests and...

...get the request serviced. The application proxy supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

Particularly, in performing the verification, translation and communication functions, the Report Manager server, the Report Scheduler server and Inbox server proxies each employ front...the data to store. After a message is received, the parser object is created in the RMDispatcher.c object which is a file comprising the **business** logic for handling metadata messages at the back-end. It uses the services of an RMParse class. Upon determining that the client has sent a...

#### Claim

... Web based 8 communications with said reporting system, said client 9 workstation identified with a customer and providing said integrated

interface; 11 at least one **secure server** for managing client 12 sessions over the Internet, said **secure server** 13 supporting a secure socket connection enabling 14 encrypted communication between said browser application client and said **secure server** ; 16 a report manager server in communication with 17 said at least one **secure server** for maintaining an 18 inventory of reporting items associated with a 19 customer, the reporting items comprising report data types and report customization features for...

...for a desired report, and in response, generates said report request message for 6 communication over a secure communications link via said at least one **secure server** to said report manager server.

1 4. The reporting system as claimed in Claim 1, 2 wherein said data retrieval device includes a process 3...further 2 including the step of supporting encrypted 3 communication of report request messages and report 4 response messages between said client application and a **secure server** over said secure communications link.

#### APPENDIX A

#### Retrieve Report Template List

..... Required'." 1-A=etable  
-44; !:Parameter' A"17cirameter  
Value  
i ~Name TWe  
GRTL Request...P e- NRL Request Char (3) Yes TYPE= Designates Char (30)  
Yes e.g. Broadband, report type, call priced, real-time, detail type, or  
exception, **invoice** , news type MIR, CCID, priced call detail, outage  
ENTPID= -7Enterprise ID Char (8) Yes Enterprise ID USERID= User's ID  
7Char (20) Yes UserID STDRPTID...

...is server in ARD. Limit using the on request ID is StarWRS 2147483647.

#### Report Requeste

PRIORITY= Standardized Char (1) ONLY 1 = fatal, 2 major, 3 **Network** news  
= minor, 4 **Management** info(default), 5 no Priority Levels alert '  
COMPRESS Designates '\*' Char (1) Yes 0 = data not whether the data  
compressed, 1 has been data compressed compressed...report, call Detail,  
F = News detail, or news TYPE= Designates Char (30) Yes e.g. Broadband,  
report type, call priced, unpriced, detail type, or exception, **invoice** ,  
news type MIR, CCID, priced call detail, outage USERID= Designates  
Char(20) Yes Starbu cks username intended as assigned in recipient or  
StarOE audience RPTID...

5/3,K/7 (Item 7 from file: 349)

DIALOG(R) File 349:PCT Fulltext  
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00632945

INTEGRATED PROXY INTERFACE FOR WEB BASED TELECOMMUNICATIONS MANAGEMENT  
TOOLS

**INTERFACE MANDATAIRE INTEGREE POUR OUTILS DE GESTION DE TELECOMMUNICATIONS  
SUR LE WEB**

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Detailed Description  
Claims

**English Abstract**

A Web/Internet based monitoring system provides a common **GUI** enabling the requesting and real-time viewing of telecommunication network traffic and statistical data pertaining to a customer's telecommunication network. Such a monitoring system...

...a client browser application located at a client workstation for enabling interactive Web based communications between a customer and the monitoring system; at least one **secure server** for managing client sessions over the Internet via one or more secure connections; a device for generating statistical data based on real-time call data...

**Detailed Description**

... inter exchange carrier enterprises such as AT&T, Sprint, MCI, etc., provide management and performance information relating to telecommunications, e.g., toll-free, networks. Such **network management** information generally includes details of network use and performance such as, for instance, real time status and alarm information, near real time performance data, traffic...

...a client browser application located at a client workstation for enabling interactive Web based communications between a customer and the monitoring system; at least one **secure server** for managing client sessions over the Internet via one or more secure connections; a device for generating statistical data based on real-time call...the software architecture of the networkMCI Interact system; Figure 3 is an illustrative example of a backplane architecture schematic; Figure 4

illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 5 is a diagram depicting the physical networkMCI Interact system architecture; Figure 6 illustrates...

...screen displays illustrating the real-time monitoring (RTM) system functionality of the invention.

The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system ("nMCI Interact") such an integrated suite of Web-based applications provides...

...on a customer work station 10 and provides customer access to the enterprise system, having one or more downloadable application objects directed to front end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer requested... customer workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or Call Manager functions.

The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview...

...generally are integrated using a "backplane" services layer 12 which provides a set of services to the 45 application objects which provide the front end **business** logic and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as:

1...

...50 inter-application communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; 55 printing; ...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 80 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor 72; an alarm monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also...

...and a Message Center 77 for providing enhancements and functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to start, stop, and...Figure 2, it is understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform (a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and 40(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms (a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted into...

...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 30 and Legacy Mainframe Systems 40 which comprise the back end **business** logic applications.

45 As illustrated in Figure 5, the present invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between ...reports, such as provided by MCI's StarODS Server 33 in a variety of user selected formats.

All reporting is provided through a Report Requestor **GUI** application interface which support spreadsheet, a variety of graph and chart type, or both simultaneously. For example, the spreadsheet presentation allows for sorting by any...actual identified sender. One technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** .

Another component of the nMCI Interact

infrastructure includes order entry, which is supported by the Order Entry ("StarOE") server. The general categories of features to...the customer via the StarWRS Web Reporting System, and, supplies on-line customer access to call detail and hourly statistics that aid the customer in **Network management**, call center **management** and customer calling pattern analysis. For real time (unpriced) data, statistics are generated for the following totals: minutes, attempts, completes, incompletes, other, dto (direct termination...via an RTM graphic user interface and communicated over secure TCP/IP socket 45 connections for input over the firewall 250 to at least one **secure server**, e.g., a DMZ RTM Web Server 52 (Figure 2) that provides for authentication, validation, and session management. Particularly, the RTM server 52 communicates with...

...which determines which buttons on the home page are active, thus controlling their access to products. At steps 312 and 314 respectively, a networkMCI Interact **applet** is downloaded to the customers Web Browser via the established TCP/IP connection, and the browser presents the customer with the networkMCI Interact system ...blocked, etc. It is from this screen that a customer may view real-time information pertaining to their toll-free network usage, and make informed **business** decisions regarding call-routing plans.

As further shown in Figure 12(c), the customer may select a start time button 640 enabling selection of a...

#### Claim

... Web based 9 communications with said monitoring system, said client workstation identified with a customer and 11 providing said integrated interface; 12 at least one **secure server** for managing client 13 sessions over the Internet, said **secure server** 14 supporting one, or more secure socket connections enabling encrypted communication between said browser 16 application client and said **secure server** ; 17 a device for generating statistical data based on 18 real-time call data obtained from a telecommunications 19 network, said statistical data being generated...

5/3,K/8 (Item 8 from file: 349)

DIALOG(R) File 349:PCT Fulltext  
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00632887

**SECURE CUSTOMER INTERFACE FOR WEB-BASED DATA MANAGEMENT**  
**INTERFACE UTILISATEUR SECURISEE POUR LA GESTION DE DONNEES SUR LE WEB**  
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Detailed Description

Claims

Detailed Description

... employ HTTPS and a Web browser having Secure Sockets Layer (SSL) encryption, and they display Hypertext Markup Language (HTML) pages as a graphical user interface ( GUI ), and often include Java applets and Common Gateway Interface (CGI) programs for customer interaction.

For the enterprise, the use of off-the-shelf Web browsers... authentication procedure generally includes a logon object which prompts for and accepts the user's name and password. The logon object then communicates the logon **transaction** to a remote server responsible for screening those users attempting to access remote services. once a user has been authenticated by the system of the...

...The set of service subscription, then forms the user's entitlements for the services. Thus, for example, if a user subscribes to a toll free **network management** SUBSTITUTE SHEET (RULE 26) service, the user is entitled to access information regarding the service. on the other hand, if the user does not subscribe...is an illustrative example of a backplane architecture schematic as invoked from a home page of the present system; Figure 3 illustrates an example client **GUI** presented to the client/customer as a browser Web page; Figure 4 is a diagrammatic overview of the software architecture of the enterprise internet network

...

...the present invention's process flow during logon, entitlement request/response, heartbeat transmissions and logoff procedures; Figure 12 is a data flow diagram for various **transactions** communicated in the system of the present invention; Figure 13(a) is a schematic illustration showing the message format passed between the Dispatcher server and...on a customer work station 10 and provides customer access to the enterprise system, having one or more downloadable application objects directed to front end **business** logic as indicated at 11, one or more SUBSTITUTE SHEET (RULE 26) lk backplane service objects 12 for managing sessions, one or more presentation services...workstation 10

includes client software capable of providing a platform-independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and...

...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects which provide the front end **business** logic 11 and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as: 1) session management; 2) application launch ; 3) inter **application** communications; 4) window navigation among applications; 5) log management; and 6) version management.

#### SUBSTITUTE SHEET (RULE 26)

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 2 is an diagrammatic example...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 3 illustrates an example client **GUI** presented to the client/customer as a browser web page 60 providing, for example, a suite 70 of **network management** applications, which may include: Traffic Monitor 72; an Alarm Monitor 73; a Network Manager 74 SUBSTITUTE SHEET (RULE 26) lar and Intelligent Routing 75. Access...

...e-mail communications by providing access to user requested reports and bulk data. Additional network MCI Internet applications not illustrated in Figure 3 include Online **Invoice** , relating to electronic **invoicing** and Service Inquiry related to Trouble Ticket Management.

As shown in Figures 2 and 3, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to start, stop, and...4, it is understood that each mid-range server of suite 40 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 46 includes communication with MCI's Customer Service Management legacy platform 20(a). Such **network management** and customer network data is additionally accessible by authorized MCI-management personnel. As shown in Figure 4, other legacy or host platforms 20(b), 20(c) and 20(d) may also communicate individually with

the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated host platforms 20(a)-(d) are illustrative only and it is understood other host platforms may be interpreted...

...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which ...actual identified sender. One technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** . This technique employs SSL public-key cryptography with one-way hashing functions.

Another communications issue involving the secure communications link, is the trust associated with...the Secure web Server(s) 24 to access the underlying message; a DMZ Web header 114 which is used to generate a cookie 111 and **transaction** type identifier 116 for managing the client/server session; a dispatcher header 115 which includes the target proxy identifier 120 associated with the particular type of **transaction** requested; proxy specific data 125 including the application specific metadata utilized by the target proxy to form the particular messages for the particular middle tier...trusted source and allow applets to write to the local disk, print, read local files, and connect to a server other than the one that **launches** the **applet** . In order for an **applet** to be signed, the **applet** requires a digital certificate to be assigned to a JAR (Java ARchive) or equivalent archive file. As discussed previously, this digital certificate may be a software publisher certificate or the certificate used to verify the **server** as a trusted **server** during the SSL handshake process.

Figure 7 is a diagram which illustrates a security module design having clean separation from the browser specific implementations. The...);

```
catch(COSecurityException cose)
take care in case of security
exception
```

Referring back to Figure 10, once the browser type has been confirmed, the logon **applet** checks for the name/password entry and instantiates a session object in step 292, communicating the name/password pair to the enterprise system. The session object sends a message containing the name/password to the StarOE **server** 49 for user validation in step 294.

When the user is properly authenticated by the server in step 296, another Web page which launches the...disclaimer acknowledgment 440 on the logon page 342. If the entered userid and password are not valid or if there were too many unsuccessful logon **transactions** , the logon

object 342 communicates the appropriate message to the customer 340 as shown at 440. A logon object 342, typically an **applet** launched in the logon Web page connects to the Web **server** 344, for communicating a logon request to the system as SUBSTITUTE SHEET (RULE 26) Zt> shown at 442. The logon data, having an ...as illustrated at 446 together with the user application entitlements. The dispatcher 346 passes the data results obtained from the StarOE 348 to the web **server** 344 as shown at 444, which passes the data back to the logon object 342 as shown at 442. The customer 340 is then notified...and sends the entitlement string back to the backplane running on the client platform 10.

Furthermore, the cookie jar 352 is used to manage heartbeat **transactions**. Heartbeat **transactions**, as described above, are used to determine session continuity and to identify those processes which have died abnormally as a result of a process failure, system crash or a communications failure, for example.

During a customer session initialization, the cookie jar 352 generates a session id and sets up "heartbeat" **transactions** for the customer's session. Subsequently, a heartbeat request is typically sent from a process running on a client platform to the Web server 344...

...344 then sends the status back to the client platform process, also as shown at 450.

When a customer wants to logoff, a logoff request **transaction** may be sent to the Web server 344.

The Web server 344 then connects to the cookie jar 352 and requests logoff for the session...

...deleting the cookie, the cookie jar 352 sends a logoff status to the Web server 344, which returns the status to the client platform.

Other **transaction** requests ...sent via the Web server 344 and the cookie jar 352 as shown in Figure 12. Figure 12 is a data flow diagram for various **transactions** communicated in the system of the present invention. Typically, when a customer enters a mouse click on an application link as shown at 460, an appropriate **transaction** request stream is sent to the Web server as shown at 462. The Web server 344 typically decrypts the **transaction** stream and connects to the cookie jar 352 to check if a given session is still valid as shown at 464. The cookie jar 352...

...the Web server 344 as shown at 464. The Web server 344 on receipt of valid session connects to the dispatcher 346 and sends the **transaction** request as shown at 466. When the dispatcher 346 obtains the request, it may also connect to the cookie jar 352 to validate the session...

...the valid session connects to a targeted application server or proxy 354, SUBSTITUTE SHEET (RULE 26) 4z.

which may include StarOE, and sends the request **transaction** to the target as shown at 470. The server or proxy 354 processes the request and

sends back the response as stream of data which...

...the backplane and the applications may send messages and requests to back-end services. The client communications unit includes a client session unit and a **transactions** unit. The client session unit and the **transactions** unit comprise classes used by client applications to create objects that handle communications to the various application proxies and/or servers. Generally, the entire communications...the overall process.

In the preferred embodiment, a single cookie typically suffices for the entire session. Alternately, a new cookie may be generated on each **transaction** for added security. Moreover, the cookie jar may be shared between the multiple physical servers in case of a failure of one server. This mechanism...

...predefined period, e.g., 1 minute, to the Web server to "renew" the session key (or record). The Web server in turn makes a heartbeat **transaction** request to the cookie jar. Upon receipt of the request, the cookie jar service "marks" the session record with a timestamp indicating the most recent effectively making a session key dead. Any subsequent **transactions** received with a dead session key, i.e., nonexistent in the cookie jar, are forbidden access through the Firewall.

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4cZ

The...

...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 40 and Legacy Mainframe Systems 20 which comprise the back end **business** logic applications.

As illustrated in Figure 5, the present invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between two...180 which may be one of four values indicating one of the SUBSTITUTE SHEET (RULE 26) S7 following four message mechanisms and types:

I) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request, e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...indicates the status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction** . More complete error data will be included in the specific error message returned. The status field 140 is included to maintain consistency between requests and...

...get the request serviced. The application proxy supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

Particularly, in performing the verification, translation and communication functions, the Report Manager server, the Report Scheduler

server and Inbox server proxies each employ front...

...data to store.

After a message is received, the parser object is created in the RMDispatcher.c object which is a file which includes the **business** logic for handling metadata messages at the back-end. It uses the services of an RMParse class. Upon determining that the client has sent a...

Claim

CLAIMS We Clai :

1 1. A security system for communications 2 **network management** having an integrated customer 3 interface, said security system comprising:

4 (a) a plurality of client web browsers to enable interactive secure communications with said...

...the internet, said 13 secure web server supporting secure socket layer for 14 encrypted communication between said client browser and said secure web server, said **secure server** also 16 providing session management including client 17 identification, validation and session management to 18 link said session with said client:

19 (c) at least...

...said dispatcher server providing verification 24 of system access after client entitlements have been verified; 26 (d) said plurality of system resources 27 providing communications **network management** 28 capabilities for said client, each of said system 29 resources responsive to a request from one of said SUBSTITUTE SHEET (RULE 26) S--'r plurality of client browsers to generate client data or instructions relating to said communications network.

1 2. The security system for communications 2 **network management** as claimed in claim 1 wherein said 3 system includes digital certificates to authenticate 4 said **secure server** to said client web browser.

1 3. The security system for communications 2 **network management** as claimed in claim 2 wherein said 3 session management further includes web cookie 4 generation at each instance of client identification to link a

...

...session to 7 verify said client to said dispatcher server at each 8 transmission in said session.

1 4. The security system for communications 2 **network management** as claimed in claim 3 wherein said 3 cookie is generated by a program on a separate server 4 during an entitlements communications, after identification and authentication of the client.

1 5. The security system for communications 2 **network management** as claimed in claim 4 wherein said 3 client web browser secure socket layer

encrypts client 4 identification, authentication and said session management cookie during each transmission.

1 6. The security system for communications 2 **network management** as claimed in claim 1 wherein said 3 session cookies provide simultaneous session management 4 for a plurality of system resource platforms.

SUBSTITUTE SHEET (RULE 26)

sit>

7. The security system for communications 2 **network management** as claimed in claim 1 wherein said 3 secure web server communicates with said dispatcher 4 server over an encrypted socket connection.

8. The security system for communications 2 **network management** as claimed in claim 7 wherein said 3 system includes encryption between said secure web 4 server and said dispatcher server.

1 9. The security system for communications 2 **network management** as claimed in claim 7 wherein said 3 system includes a first encryption algorithm for 4 transmission of all customer data between said secure web

...  
...data between said secure web server and 7 said dispatcher server and a second encryption 8 algorithm.

1 10. The security system for communications 2 **network management** as claimed in claim 1 wherein each 3 client request from said web browser is encrypted with 4 a public key provided by said communications...

...client requests includes an encrypted 6 client cookie for client authentication.

1 11. A system having an integrated and secure 2 customer interface for communications **network** 3 **management** , said system including a web browser for use 4 on a client computer, and a secure web server having a system home page, said system...

...a client web browser for displaying said 7 system log on and home pages, SUBSTITUTE SHEET (RULE 26) so.~ I (b) at least one Java **applet** embedded in 2 said home page to provide interactive sessions with 3 said communications network, said sessions including 4 client authentication, session authentication and **transaction** requests for said communications network, 6 (c) an encryption layer between said browser 7 and said **secure server** to provide encryption of each 8 client session with a public key provided by said 9 communications network, each session also including session authentication with a client cookie generated 11 by said system, said session cookie being encrypted 12 with said public key during transmission of each 13 **transaction** request to said **secure server** ; 14 (d) at least one security firewall on either side of said **secure server** to prevent direct public 16 access to said communications network.

1 12. The system for communications **network** 2 **management** as claimed in claim 11, said communications 3 network further including a plurality

of application 4 servers for receiving **transaction** requests from said **secure server**, said **secure server** encrypting each of 6 said **transaction** requests with a public key algorithm 7 before transmission to a selected one of said 8 application servers.

13. The system for communications **network 2 management** as claimed in claim 12, said system further 3 including a dispatcher server for receiving **transaction** 4 requests from said **secure server**, and dispatching said request to said selected one of said application 6 servers.

SUBSTITUTE SHEET (RULE 26)

r.6 14. The system for communications **network 2 management** as claimed in claim 11, wherein said 3 communications network includes a router based firewall 4 between said **secure server** and said public Internet, and a proxy based firewall between said **secure server** 6 and any one of said applications servers.

1 15. The system for communications **network 2 management** as claimed in claim 11, wherein one of said 3 ...entitlement at log on, and a second set of entitlement during a session with a 6 selected application sever.

1 16. The system for communications **network 2 management** as claimed in claim 11, said communications 3 network further including an authentication server 4 which determines entitlement for said user object following authentication.

1...

...over the public Internet, the network system comprising:

6 a plurality of disparate application server 7 platforms, each server platform having one or more 8 **transaction** requesting nodes, each of the **transaction** 9 requesting nodes generating a plurality of **transaction** requests; 11 at least one client object resident in-a 12 customer platform, the client object having a user 13 interface for enabling a customer...

...one 14 or more of the disparate application servers on the SUBSTITUTE SHEET (RULE 26) I integrated network system, the client object also 2 generating **transaction** requests in response to a 3 customer selection; 4 an administrative server platform, said administrative server platform having a security 6 profile for each customer having access to said network 7 system, said security profile having information 8 associated with the customer; 9 a first security module for encrypting **transactions** between said customer platform and said 11 network system in accordance with a first security 12 protocol; 13 a second security module for encrypting 14 **transactions** between within said network system with a second security protocol; 16 a plurality of messaging objects for 17 encapsulating the **transaction** requests and the 18 **transaction** responses and communicating the **transaction** 19 requests and the **transaction** responses between the client object, the security modules,

and the 21 **transaction** requesting nodes on the disparate 22 application server platforms, 23 whereby each of the **transaction** requesting 24 nodes may obtain the security profile associated with the customer by transacting with the administrative 26 server platform.

18. The integrated network system...

...1 19. The integrated network system as claimed 2 in claim 18, wherein the first security module for SUBSTITUTE SHEET (RULE 26) C-2 encrypting **transactions** between said customer platform 2 and said network system encrypts said transmissions 3 with a public key algorithm.

1 20. The integrated network system as claimed 2 in claim 17, wherein the second security module for 3 encrypting **transactions** between within said network 4 system encrypts said transmissions with a public key algorithm, having a secret public key.

1 21. The integrated network system...providing a secure 2 communications session between a customer and an 3 enterprise network over the public Internet, said 4 method comprising:

(a) authenticating a **secure server** to a 6 customer's client browser over the Internet; 7 (b) encrypting communications between said 8 client browser and said **secure server** with a first 9 security protocol; (c) authenticating said customer and a set 11 of customer entitlement at log on with an 12 authentication server  
...

...as claimed 4 in claim 22, said method further comprising the steps of packet filtering communications between said 6 customer's client browser and a **secure server** within 7 said network.

1 25. The method for providing a secure 2 communications session between a customer and an enterprise network over the public Internet as claimed 4 in claim 24, said method further comprising the step of creating a proxy to filter communications between said 6 **secure server** and an application resource within said 7 network.

26. The method for providing a secure 2 communications session between a customer and an

3 enterprise network over the public Internet as claimed 4 in claim 23, wherein a digital certificate is used for the step of authenticating the **secure server** to the 6 customer's client browser.

27. The method for providing a secure 2 communications session between a customer and an

3 enterprise network...

...customer and an

3 enterprise network over the public Internet as claimed 4 in claim 27 which uses a negotiated SSL protocol to authenticate the **secure server** and encrypt 6 communications between the customer's client browser 7 and the **secure server** .

1 29. The method for providing a secure  
2 communications session between a customer and an

3 enterprise network over the public Internet as claimed...said customer at log on, said objects 7 providing interactive sessions with said enterprise 8 network, said sessions including client authentication, 9 session authentication and **transaction** requests for said enterprise network.

1 .34. The method for providing a secure 2 communications session between a customer and an

3 enterprise network over...

**5/3,K/9 (Item 9 from file: 349)**

DIALOG(R)File 349:PCT Fulltext  
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00632821 \*\*Image available\*\*

**WEB BASED INTEGRATED CUSTOMER INTERFACE FOR INVOICE REPORTING  
INTERFACE CLIENT INTEGREE DE RAPPORT SUR LES FACTURES BASEE SUR LE WEB**

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**WEB BASED INTEGRATED CUSTOMER INTERFACE FOR INVOICE REPORTING**

Fulltext Availability:

Detailed Description

Claims

English Abstract

A Web-based **invoice** viewing system and method for enabling a customer to generate **invoices** relating to various network services provided to the customer by an enterprise. The customer workstation having a Web browser (620) and a graphical user interface (630) to present a list of **invoice** documents organized into products and date ranges applicable to the customer for the customer to select and view. Various displays presented at the customer workstation...

...faxed, or queued for batch printing at the enterprise remotely. The customer is enabled to view dynamically summed results of numerical figures displayed on the **invoice** documents by highlighting the numbers in the document directly on the display.

Detailed Description

**WEB BASED INTEGRATED CUSTOMER INTERFACE FOR INVOICE**

**REPORTING**

The present invention relates generally to information delivery systems and, particularly, to a novel, WWW/Internet-based, **invoice** viewing service for customers requesting information located at the remote back-end server of telecommunications service entities.

Each of the major telecommunications service entities, e.g., MCI, AT&T, and Sprint, presently provides for the presentation and dissemination of customer **invoice** account and **network management** information to their customers through a Windows-based graphical user interface resident on a personal computer. Typically, service entity customers are enabled to directly dial...

...to the entity's application and database servers, and initiate the generation of reports of their requested account information through the reporting graphical user interface ( **GUI** ). The report requests initiated by the customer are processed by the entity's application server, which retrieves the requested customer information from one or more databases, processes and formats the information for downloading to the client's

reporting **GUI** .

Most telecommunications service providers offer many different services, and many of the associated service applications have been developed independently over time, and, operate on different legacy platforms. For instance, MCI's Service View platform (11MSV'1) provides customers with Windows based client- **server** applications for customer **network management** and call usage analysis. These applications, run independently of one another and can oly generate application specific reports one at a nL L SUBSTITUTE SHEET...

...Figure 6. In accordance with the invention, a first component includes a user browser 620, for example, the Internet Explorer@ 4.0, deploying a backplane **applet** via which the online **invoicing GUI** client application 630 may be invoked.

As described in reference to Figures 3 and 4, the application backplane is a Java@ applet invoked inside the networkMCI Interact's home page and is the conduit through which all other client applications may be deployed, including the online **invoicing GUI** client application 630. The online **invoicing** may typically be accessed from the home page (Figure 4) with an icon labeled "Online **Invoices** " 252i (Figure 4). A online **invoicing** session begins when a customer clicks on the online **invoices** icon, triggering the backplane to launch the client **GUI** application 630.

The online **invoicing GUI** client application 630 provides an interface to which a customer may request and view various billing **invoices** associated with the application services subscribed by the customer and provided by the networkMCI Interact system. For example, using the **GUI** client application 630, customers may drill down on their applicable **invoices** , typically accessing them via the given customer identifiers such as the corp id, bill payer, or mega account numbers. The **invoice** reports may also be available for various application services including toll free, Frame Relay, and ATM.

Also shown as part of the online **invoicing invoice** viewing system architecture 600 of Figure 6 is a Web server/dispatcher component 635 which provides for the transport between the Web browser and an online **invoicing** proxy interface including all secure communications and encryption. In the preferred SUBSTITUTE SHEET (RULE 26) time. For example, applications such as the Toll Free Network Manager which generates toll free **network management** data reports, Perspective which generates reports on priced call detail data for usage analysis and trending, and TrafficView which generates unpriced call detail or real...

...there are little cross application interoperability and data sharing, a customer must always use the separate applications to gain access to their data including specific **invoice** data associated with the separate applications.

Furthermore, the implementation mechanism of individual application servers frequently relies on the native vendor-supplied listener programs and communication...

...programs to specific native vendor-supplied listener programs.

It would also be desirable to provide a consolidated Web-based reporting system that provides a common **GUI** enabling both report requesting, customizing and viewing of various types of data from different server applications in one user session. With the integrated reporting, customers will have the ability to include **invoice** reports on their traffic and billing reports.

#### SUBSTITUTE SHEET (RULE 26)

Accordingly, to resolve the above shortcomings, the present invention provides a Web based **invoice** viewing system for online presentation of various billing and **invoice** documents associated with network services provided to a customer. The present invention is operable by a customer having at a minimum, a workstation with an...

...a client browser application typically downloaded by the Web browser over the Internet during a session initiation stage. The client browser application provides a common **GUI** capable of communicating securely with enterprise Intranet applications, allowing the customers access to their billing and **invoice** reports from anywhere and any platform in the world.

The back-end server operating in the system of the present invention maintains data from the various application services for generating and providing billing and **invoice** reports. In its operation, the back-end server provides an efficient storage mechanism for storing the data in the most compact format such that the...to an enterprise, and also fax customer retrieved documents.

The above and additional features of the present invention are attained preferably with a Web based **invoice** viewing system which enables a customer to access, view or display various **invoices** over the Internet. The **invoices** generally relate to application services, or more specifically, telecommunications services provided by an enterprise to the customer.

The system of the present invention includes a...

...workstation, which is initially downloaded by a Web browser running in the customer workstation. The client browser application enables interactive Web-based communications with the **invoice** viewing system and provides an integrated interface. The present invention further includes a Java application/applet for providing the **invoice** viewing specific functionalities. The Java application/applet is typically invoked from the client browser application and is responsible for receiving customer requests and providing customer selected **invoice** documents at the customer workstation.

At the enterprise side, the present invention includes a number of web servers for managing customer sessions over the Internet...

...client browser and Java application/applets for downloading to the client workstation.

At the enterprise Intranet, the present invention includes a dispatcher for receiving encrypted **transactions** from the web servers and dispatching them to specific application servers, and more specifically, to the online **invoicing** server. The online **invoicing** server maintains one or more databases having image files associated with documents from various application services. The online **invoicing** server typically receives **invoice** request messages from the Java application/ **applet** , accesses the database in response and sends response messages having requested **invoice** data back to the Java application/ **applet** via the dispatcher and the web **servers** for presentation at the customer workstation.

Further benefits and advantages of the invention will become apparent from a consideration of the following detailed description.

Preferred...the software architecture of the networkMCI Interact system; Figure 3 is an illustrative example of a backplane architecture schematic; Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 5 is a diagram depicting the physical networkMCI Interact system architecture; Figure 6 illustrates the online **invoicing** architectural scheme; Figure 7 is a sample criteria screen launched from the home page; Figure 8 is a sample screen displaying a list of **invoice** reports; Figure 9 is a sample screen displaying an **invoice** document; Figure 10 is a flow diagram illustrating an online **invoicing** process flow; Figure 11 is a flow diagram illustrating an online **invoicing** back-end server process flow during document indexing and storing; Figure 12 is a flow diagram illustrating an online **invoicing** back-end server process flow when responding to client requests for document presentation; Figure 13 is a sample **invoice** display screen having accumulator buckets used for dynamic summation; Figure 14 is a dialogue box used for naming the accumulator buckets; Figure 15 shows a sample **invoice** display screen with the accumulator buckets having the sum of the figures highlighted; SUBSTITUTE SHEET (RULE 26) Figure 16 shows a dialogue box used for faxing the **invoice** document; Figure 17 shows a screen that is displayed when a batch print function is selected; and Figure 18 shows a sample message pop-up...

...print job has been queued.

An overview of the Web-enabled integrated system The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system ("MCI Interact") such an integrated suite of Web-based applications provides...

...resident on a customer workstation 10 and provides customer access to

the enterprise system, having one or more downloadable application objects directed to front-end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer ... software capable of providing a platform SUBSTITUTE SHEET (RULE 26) independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or call **management** functions.

The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview of the software...

...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects that provide the front-end **business** logic. The backplane services layer 12 also manages the **launching** of the **application** objects. The networkMCI Interact common set of objects provide a set of services to each of the applications. The set of services include: 1) session management; 2) application **launch** ; 3) inter- **application** communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 3 is a diagrammatic example...

...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 250 providing, for example, a suite 252 of **network management** reporting applications including: MCI Traffic Monitor 252c; Call Manager 252f; a Network Manager 252e and online **Invoice** 252i. Access to network functionality is also provided through Report Requester 252b, which provides a variety of detailed reports for the client/customer and a Message Center 252a for providing enhancements and functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to start, stop,

and...Figure 2, it is understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 40(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and 40(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted...

...interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 30 and Legacy Mainframe Systems 40 which comprise the back-end **business** logic applications.

As illustrated in Figure 5, the present invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between two...reports, such as provided by MCI's StarODS Server 33 in a variety of user selected formats.

All reporting is provided through a Report Requestor **GUI** application interface which support spreadsheet, a variety of graph and chart type, or both simultaneously. For example, the spreadsheet presentation allows for sorting by any...

...the inbox when a report is selected.

A common database may be maintained to hold the common configuration data which may be used by the **GUI** applications and by the mid-range servers. Such common data includes but are not limited to: customer security profiles, billing hierarchies for each customer, general...actual identified sender. one technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** .

Another component of the Mci Interact infrastructure includes order entry, which is supported by the Order Entry ("StarOE") server. The general categories of features to...

...10) Call Manager. The order entry functionality is extended to additionally support 11) Event Monitor; 12) Service Inquiry; 13) Outbound Network Manager; and, 14) Online **Invoicing** .

The self-monitoring infrastructure component for Mci Interact is the employment of mid-range servers that support SNMP alerts at the hardware level. In addition...

...Monitor, and system administration applications. Further functionality integrated into the software architecture includes applications such as Outbound Network Manager, Call Manager, Service Inquiry and Online **Invoicing** .

#### Online **invoicing**

The present invention is directed to a system, referred to as online **invoicing** , which offers customers visibility into all of their **invoices** . The online **invoicing** provides the ability to view **invoices** and reports online, and offers a facility for printing and faxing documents. The online **invoicing** takes information available from different billing systems and incorporates that information into its database.

The information is then retrieved and presented to a user according to the user-specified requests. A general block diagram illustrating the online **invoicing** system architecture 600, integrated with the networkMCI SUBSTITUTE SHEET (RULE 26) embodiment, secure communication from the user browser 620 to a DMZ Web server 635...

...a second TCP/IP socket connection. These paths enable customer requests and server responses to be communicated from the user browser 620 to the online **invoicing** server 650.

Specifically, the dispatcher 635 forwards user requests, such as "get index" message for retrieving a list of documents available for viewing by a customer, to the online **invoicing** server 650 process that employs an integrated proxy application 640 for receiving and interpreting the user messages and performing the online **invoicing** functionality. This proxy capability includes a multithreaded engine enabling multiple, simultaneously executing sessions supporting anticipated user load. The interface between the dispatcher server 635 and the online **invoicing** server 650 is also message-based, employing, e.g., TCP/IP socket transport, and, as will be described, a messaging protocol that is defined and...

...a generic message header followed by proxy-specific data. The same process of messaging scheme is employed in the other direction. That is, the online **invoicing** proxy 640 sends the generic header, followed by the proxy-specific response back to the dispatch server 635 for communications over the firewall and back to the user browser 620.

The online **invoicing** proxy 640 uses the networkMCI Interact platform's "template proxy" as an implementation of the listener/slave portion of the proxy. The proxy 640 passively...

...the parent proxy continues to listen for other request. The forked process is generally dedicated to handling the detected requests. The forked process detects a **transaction** type from the proxy protocol header. The **transaction** types generally include synchronous, asynchronous, and bulk transfer, as described above. The proxy 640 then calls a "back end" function whose function is dependent on the **transaction** type detected. The back-end functions typically provide individual services for which the application is responsible.

For example, if the **transaction** type for a detected request is of "synch" type, the forked process executes the synch back-end function and passes the request as an argument. The synch back-end function generally passes the request to a CICS task on the online **invoicing** server and waits for a response. More specifically, the synch function first establishes a CICS task via a direct TCP/IP socket connection to the preamble block is piped from the CICS task, to the requesting process, and typically all the way back to the client **GUI** application. Upon completion of piping the data, the synch function disconnects the CICS task and exits. The forked process which called the synch function also terminates itself by exiting.

In the preferred embodiment, the online **invoicing** server 650 stores documents from various billing systems and performs the various database queries and function calls in response to requests received from the customer via the online **invoicing** proxy 640. Particularly, the online **invoicing** server 650 is responsible for tasks including data collection, calculation, storage, and report generation. A more detailed description of the server 650 is provided with reference to Figures 11 and 12.

During its operation, the online **invoicing** server 650 supports communications with a system administration component ("StarOE") 660 which provides order entry functions including functionality necessary to manage (create, update, delete) online **invoicing** users, and allows for a feed of the appropriate order entry information to the online **invoicing** server 650 in order to properly associate the appropriate online **invoicing** functionality and data to the right customer once given admission to the online **invoicing invoice** viewing service. The StarOE process 660 essentially functions to provide the mechanisms for authenticating SUBSTITUTE SHEET (RULE 26) users, and supplying entitlement information, as well as enabling order entry for the various online **invoicing invoice** viewing services.

As described previously, order entry for the networkMCI Interact browser and all applications on networkMCI may be made through the networkMCI StarOE order entry system. The online **invoicing** application service may be ordered for all **business** markets customers. For example, a user may select to have online **invoicing invoices** for a given enterprise, corp, bill payer, and/or mega account number. These include all NCBS, Toll Free, PLBS, and Mega **invoices**. In addition, selections may include **invoice** images for MCI CVNS-ROW, MCI CVNS-Mexico, MCI CVNS-Canada as well as Stentor Advantage Vnet/CVNS **invoice** images.

In the preferred embodiment, a messaging interface is utilized between the StarOE 660 and the online **invoicing** server 650 for communications mechanisms. The online **invoicing** server 650, typically functions as a client and receives authentication information, billing ids, and level of service information, which may also be supplied in response to the launch of the online **invoicing** GUI client application 630. For example, when online **invoicing** client application 630 is launched from the home page (Figure 4), a customer identifier such as the userid and the applicable corp ids and mega account numbers may be retrieved by the order entry system administration server, StarOE 660, and passed to the online **invoicing** server 650. The online **invoicing** server 650 then makes the necessary association to individual bill payers that the user is authorized to view. The view of **invoices** may include a particular portion of the **invoice** as well as the entire **invoice** .

#### SUBSTITUTE SHEET (RULE 26)

The online **invoicing** server 650 also may interact with the inbox, a component of the networkMCI Interact reporting system, StarWRS 670, by storing the news information regarding the online **invoicing** service. Generally, the inbox is a central repository for holding messages, which may include event notifications, and report data from the networkMCI Interact application services, including the online **invoicing** application service. The files may be transferred by using one or more of the following transport mechanisms: synchronous **transaction** , asynchronous **transaction** , and synchronous bulk transfer. These transport mechanisms are provided by the networkMCI Interact's application program interfaces (APIs) for enabling the proxies to communicate with the user browser 600 and intervening Web servers and dispatcher 635. As an alternative to the above listed transports, the online **invoicing** server 650 may use the file transport protocol (FTP) "put" command for very large transfers, in order to obviate some of the network loads. The FTP transfers may be coordinated by synchronous **transaction** transport mechanism requests with the inbox service. The **invoice** files saved on the inbox typically have a time-to-live tag, e.g., 45 days, in order to avoid overloading of the inbox.

In addition, the **invoice** files saved on the inbox may be retrieved and viewed using the report requestor and the report viewer, two additional components of the StarWRS 675 residing in the user browser 600. Via the report requestor, the customer may request tailored reports regarding the **invoice** files and view or print the customized **invoice** reports displayed by the report viewer.

#### SUBSTITUTE SHEET (RULE 26)

Figure 10 is a flow diagram 900 illustrating an example of the networkMCI Interact online **invoicing** process flow in detail. At step 902, a user 901 types an appropriate URL for retrieving the networkMCI Interact logon page, and types name and...  
...at step 910, the Web server requests a list of authorized applications for the user from the StarOE. At step 912, the Web server then **downloads** the appropriate client **application** files and at step 914 presents the networkMCI Interact homepage to the user from which the user may select

the online **invoice** functionality.

Upon the selection, an online **invoice** screen is presented. At step 916, the user then enters the customer identifiers on the online **invoice** screen. The user entered customer identifier is then checked against the available list of customer identifiers in the online **invoice** server's database at step 918. If the customer identifier does not exist or is not a valid type at step 920, the user is prompted to re enter the identifier at step 919. When the customer identifier is properly validated, the user is presented with the online **invoicing** products associated with the customer identifier at step 922. The user -then may select products by their date ranges at step 924 for viewing. At...

...926, a server module then retrieves a list of document based on the selected product and date SUBSTITUTE SHEET (RULE 26) range from the online **invoicing** database, and at step 928, the list is presented to the user, from which the user may select to view a document, at step 930. Upon the user selection, the server modules retrieve the document from the database at step 932. At step 934, the **invoice** and/or report documents are presented to the user at the user's workstation. At step 936, the user may scroll through, or print the...

...step 928.

The information stored in the database 655 generally originate from different billing systems.

When data is available from these billing systems, the online **invoicing** server typically performs a conversion process and stores the converted data on tape until an audit approval. When the converted data is audited and approved, the data having the **invoicing** documents are stored to the database 655. After the data has been stored in the database for a predetermined period, it may be moved from...

...and then migrated to an optical shelf where the data may be available for a certain period.

Having described generally, an overview of the online **invoicing** application service and its integration with the networkMCI Interact's network and data infrastructure, the specific functionalities of the online **invoicing** application, namely the online **invoicing** GUI application on the client platform side and the online **invoicing** server in the enterprise Intranet, will now be described in detail below.

online **invoicing** GUI application  
SUBSTITUTE SHEET (RULE 26)

The online **invoicing** GUI application is implemented in Java to ensure platform independence and particularly is developed using many of the networkMCI Interact's common objects for achieving interoperability with the application backplane.

Specifically, the online **invoicing** GUI application's startup code implements the COApp class, typically derived from the CoAppImpl

interface. The COApp provides an applet-like interface and includes applet methods such as getImageo and getAppletContexto and allows Java applet prototypes to be easily converted to COApps. The online **invoicing GUI** application, via the COApp, may create its own display space and present its user interface in a separate frame by having the space in one ...a Web page, a concurrent (side-by-side) access to more than one networkMCI Interact application service is possible.

In an alternate embodiment, the online **invoicing GUI** application's startup code may be implemented using the COApplet class. The COApplet class extends the Applet class and may be launched by the browser...

...display space.

The COApplet class implements most of the COApp interface by forwarding it to a contained COAppImpl object.

The client component of the online **invoicing** includes a client interface for the user to select what data to retrieve. The data is then retrieved through various application processing, and a list of **invoices** and reports are provided for the user to choose from for online viewing. When a customer clicks on the "online **invoice**" icon 252i on the home page (Figure 4), after a proper authentication via a logon, the customer is presented with a criteria screen 700 as shown in Figure 7. The customer may specify various types of, and date ranges for, **invoices** desired, such as the Vnet **invoices** and the Concert Cross Border Reporting, using this screen. The criteria screen 700 is divided into a customer identifier section 710, products section 722, and dates section 724. The customer identifier type includes identification by corporate id 712, account id, bill payer id, and/or mega id. Each online **invoicing** user is given at least one identifier type 712 and a customer identifier number 714 associated with the type at the time of order entry via the StarOE. The StarOE maintains this customer information and communicates the information to the online **invoicing GUI** application, when the application is invoked by the backplane applet. Accordingly, at the same time the online **invoicing GUI** application displays the criteria screen 700, it also populates the identifier type 712 and customer identifier 714 fields automatically as received from the StarOE user...

...system.

#### SUBSTITUTE SHEET (RULE 26)

The user may then select a desired identifier type from the list of identifier types shown at 712.

The online **invoicing GUI** application then automatically fills in the customer identifier field 714 associated with the identifier type selected. In addition, if the customer's last selection...

...screen 700, the corp id identifier type will be selected automatically. After selecting a desired identifier, the user typically then may execute the search of **invoices** available for that identifier by clicking on the

retrieve button 716, pressing an enter key, or using a fast key combination such as Alt+S.

The products and dates sections 722, 724 are used for displaying the service products for which **invoice** viewing is available for a given customer identifier type and the date range for the available **invoices**. When the user executes the search, the products field 722 is filled in with the date ranges 724, indicating available **invoice** reports for various period ranges. For retrieving **invoice** documents, the user may select ranges of dates including multiple ranges of dates as shown at 724, and then click on the retrieve button 716...

...fast key combination Alt+R, or click on any area within the date range list box 724.

Upon executing the retrieve user command, the online **invoicing GUI** application displays the screen shown at Figure 8 listing the report documents. For each document, date, **invoice** number, bill payer id, and number of pages are displayed as shown at 800. The status bar 810 at the bottom of the screen may...

...loaded. The number of indices which may be loaded at one time may SUBSTITUTE SHEET (RULE 26) be configurable by a customer via the online **invoicing GUI** application. An **invoice** report listed then may be selected and retrieved by clicking on the retrieve button 716, pressing an enter key or double clicking on a highlighted...

...to enter in the desired page range for viewing. The mail/payment option 832 for retrieving only the remittance pages without having to retrieve additional **invoice** pages, is available from this screen.

Figure 9 illustrates a sample **invoice** document 840 retrieved when an **invoice** item is selected from a screen 800 shown at Figure 8. Using the menu bar 842 or a tool bar 844, a customer may save...by clicking on the clear button 820a after selecting a bucket. Clear all 820b clears all the buckets.

An additional feature offered by the online **invoicing** application may include an ability to fax the retrieved documents. When a fax button 844a is pressed from the tool bar which may typically look...

...page, specified range of pages, or the entire document by making an appropriate selection on select pages section 862 and clicking OK button 864.

#### Online **invoicing** server

As described above, the online **invoicing** provides on-line visibility to various networkMCI Interact documents. In presenting various documents online to a customer, the **GUI** client application communicates to a online **invoicing** server via the proxy for retrieving up-to-date information which the server maintains. These documents are indexed and stored in the online **invoicing** 's database 655 (Figure 6). The online **invoicing** server includes several processes for performing the indexing and storing of the documents.

Figure 11 illustrates a process flow diagram of the online **invoicing** server. The server may receive data from a number of data centers 1032. Figure 11 shows three data center locations: North Royalton (NOR) 1032a, Perryman (PYM) 1032b, and Sacramento (SAC) 1032c, as illustrative examples. At each site, **invoice** data associated with various products is available from various billings systems associated with the products, as shown at 1034. The products may include Vnet, toll free, Cross Border, Mega, etc.

In a preferred embodiment, an online

**invoicing** 's conversion process 1036 is used to convert documents at each of the data centers. The conversion process generally defines the key information necessary to...

...FCDS) file and a conversion stats report for each conversion run. The FCDS file is the document which may eventually be incorporated into the online **invoicing** database. At step 1038, the online **invoicing** conversion process reads in a PARM file and an **invoice** file. The PARM file includes document information such as the logical record length. The **invoice** file is read one line at a time and at step 1040, key information including page numbers and document dates is placed in a header...

...until audit approval is received through MCIMail, which is sent by various groups responsible for auditing and approving the document files sent to the online **invoicing** . Once the audit approval e-mail is received, an online **invoicing** production manually enters the product/division date and the **invoice** count into the audit statistics database 1059, at step 1056. The store job is manually SUBSTITUTE SHEET (RULE 26) released at step 1058 by the online **invoicing** production control after audit approval is received.

The online **invoicing** includes a DB2 database subsystem residing in a NOR4 mainframe. The subsystem further includes an object database and an index database. An online **invoicing** store process 1060 loads the compressed document to an online **invoicing** object database and an online **invoicing** index load process 1080 stores index pointers to each document in the index database. An audit check is executed to ensure that the correct number of documents are added to the online **invoicing** databases during the object load and index load processes.

More particularly, the store process loads the conversion stats record into the audit stats database at...

...file, which includes the pointers to the document, as shown at step 1066. The store process 1060, the loads the compressed documents into the online **invoicing** object database 1067, as indicated at step 1068. At step 1070, the store process 1060 then creates a store status report and loads the report...

...of time. Once the indexes are loaded into the database, the documents are available for viewing.

The following database tables are included in the online **invoicing** database: a product cross reference table which assigns the online **invoicing** product code to the product name; a CDSPARM table which keeps the store precess run statistics to allow for a ...typically received from the various SUBSTITUTE SHEET (RULE 26) networkMCI Interact's application services. Table 2 lists various billing systems providing product feeds to online **invoicing** for document imaging. Additional data feed may also be accommodated as more services are added.

Table 2

Billing Systems Product feeds

New Commercial Billing VNET, Vision **invoices** , System (NCBS) Vision MIR's, Vision ,trend reports Cross Border Stentor VNET Cross Border Discount Report, Stentor Vision Cross Border Discount Report, Concert Cross Border...

...LDSA and AT&T Backup reports MEGA networkMCI Calling, HyperStream, MEGA products Directed Billing VNET Directed Billing and Vision Directed Billing

Network Systems Osprey networkMCI **Business** , InternetMCI Session Detail Reports, VNET and Vision Session Detail Reports PLBS Private Line: T-1, VGPL, DSO, FT-1, DDS, TDS, T45, AND DS3 Tollfree toll free **invoices** , call detail and rebills Metro/local Subscriber Billing SUBSTITUTE SHEET (RULE 25) Outside Vendor PPSB statements, Aurora PPV and PPP statements The online **invoicing** server application is typically written in COBOL !I using CICS/DB2 and OAM.

The persons skilled in the art would appreciate that the server application may also be implemented with any other compiler languages or software tools. The server application includes a startup **transaction** (EDUP), and a multipurpose **transaction** , EDS2. The EDUP **transaction** passes several DB2 tables such as a function table, a version control table, and the batch print request table. The EDUP **transaction** also calls OAM to verify OAM is active and to get the token for future calls to OAM. An in-core table is built for...

...storage records are built for version control and batch print pricing. The EDUP is generally executed at CICS startup time.

EDS2 is a multi-purpose **transaction** which is started when a request is received from a client **GUI** application. Its functions may include product and date listing, index retrieval such as shown at 800 Figure 8, and batch print request storing. The **transaction** uses the common top-level function (EDOCSS000) and links to a lower level function designed to perform a specific task, based on a specific function...  
...results are passed back to the top-level function which checks return codes for possible error. The data result is then passed to the client **GUI** application via the proxy and the Web/dispatcher 635 (Figure 6), and statistics are written to a VSAM file. EDS2 is also executed for document retrieval for retrieving **invoice** documents shown at 840 Figure 9. It ...120 illustrating the server processes for responding to the client

requests. After a user 1202 properly logs on the networkMCI Interact and invokes the online **invoicing** application at step 1204, by selecting an appropriate icon on the networkMCI Interact homepage, the online **invoicing** client **GUI** application, at step 1206, generally requests communications with a listener process running in the server. The communications request is typically performed via the web server, dispatcher, and the proxy, as described above with reference to Figure 6.

Generally, the communications from the online **invoicing** server to the client workstation is performed by a set of calls to the TCP/IP address space. As an example, a listener process, EZACIC02...

...activated at CICS initiation, and constantly "listens" for activities. When a request is received from the client, the listener, e.g., EZACIC02, invokes the EDS2 **transaction**, at step 1208. At step 1210, CICS invokes the first program, i.e., EDOCS000 in the example shown, in the **transaction** EDS2 via the CICS **transaction** control table. Then, at step 1212, EDOCS000 loads system tables into memory. In addition, EDOCS000 also makes calls to TCP/IP to communicate with the client **GUI** application. EDOCS000 is also responsible for logging both successful and unsuccessful requests, as well as routing the request to one of many sub programs, based...

...results of the lower level results, produces error entries where needed, writes statistics, and passes any data retrieved (or an error) back to the client **GUI** application.

After each call to a subroutine, EDOCS000 checks a return code. EDOCS000 also checks return codes from calls to the TCP/IP and posts...

...as needed. When all the processing necessary for responding to the client is complete and response data is successfully sent to the client, the client **GUI** application sends an acknowledgment for the receipt of the data, back to the server. The socket is then closed, freeing it for another request ...associated with a customer identifier. This process gets all entries from the account/product cross-reference table for the customer identifier received from the client **GUI** application.

#### SUBSTITUTE SHEET (RULE 26)

For each entry in the account/product cross-reference table found, the process looks up the product on the product...

...followed by dates sorted in descending order, for proper display at the client workstation. At step 1216, the sorted data is returned to the client **GUI** application for viewing by the user.

EDOCS000 links to EDOCS001 and executes it when a client **GUI** application requests index retrieval for specified dates within specified products.

EDOCS000 passes in the customer identifier, the product and a list of dates received from the client **GUI** application as entered in the criteria screen 700 at Figure 7. At step 1218, EDOCS0001 reads the index table and extracts from the online **invoicing** database all matching

entries and sorts them in order of date and **invoice** numbers. Different sorting order may be utilized for different products. The entries meeting the product/date criteria are then sent back to the client **GUI** application for presentation to a customer at step 1220. The matching entry message, which is sent to the client **GUI** application includes a subset of entry records found.

EDOCS000 links to EDOCS020/EDOCS040 and executes either one when a client **GUI** application SUBSTITUTE SHEET (RULE 26) requests for document retrieval such as the **invoice** document 840 shown at Figure 9. EDOCS020 and EDOCS040 are generally used for document retrieval and are clones of each other. The difference between the...

...document meeting the requested page range into the allocated storage as shown at step 1222. The retrieved document is then sent back to the client **GUI** application for presentation to the customer.

At step 1224, EDOCS220 and EDOCS440 are used for object searches on the document requested. These processes perform similar...

...the object to find pages in the requested range for the requested document. At step 1226, the retrieved document is sent back to the client **GUI** application and is displayed on the user's workstation.

For servicing ...the EDBPRINT table layout, and a new row is inserted into DB2. Errors from EDOCS050 are sent to EDOCS000, which reports them to the client **GUI** application.

While the invention has been particularly SUBSTITUTE SHEET (RULE 26) shown and described with respect to preferred embodiments thereof, it will be understood by...

#### Claim

CLAIMS ..CLM:

What is claimed is:

1 1. A Web-based **invoice** viewing system for 2 enabling a customer to retrieve an **invoice** , over the 3 Internet, which relates to an application service 4 provided by an enterprise to the customer, the system comprising:

6 a client browser application located at a 7 customer workstation for enabling interactive Web-based 8 communications with the **invoice** viewing system and 9 providing an integrated interface; at least one **secure server** for managing 11 customer sessions over the Internet, the **secure server** 12 supporting a secure socket connection enabling 13 encrypted communications between the client browser 14 application and the **secure server** ; an **invoice** presentation device for enabling 16 selection and presentation of **invoice** documents in 17 accordance with customer entitlements, the **invoice** 18 presentation device further generating an **invoice** 19 request message in response to customer selection of a specific **invoice** option and forwarding the **invoice** 21 request message via the **secure server** ; and 22 an **invoice** server

device for maintaining a 23 database of image files associated with documents from 24 the application service and receiving the **invoice** request message, the **invoice** server device accessing 26 the database in response to a request message and 27 generating a response message for forwarding back to 28 the **invoice** presentation device via the **secure server** , 29 wherein the response message is assembled in a form suitable for display and the **invoice** SUBSTITUTE SHEET (RULE 26) 31 presentation device presents a customer selected 32 **invoice** document at the client workstation.

33 2. The Web-based **invoice** viewing system as

34 claimed in claim 1, wherein the database of image files further includes an object database, and the **invoice** 36 server device further includes:

37 conversion process for imaging documents by 38 defining key information necessary to retrieve 39 documents from the application service and compress the documents for storing; and 41 store process for loading the compressed 42 documents into the object database.

1 3. The Web-based **invoice** viewing system as

2 claimed in claim 2, wherein the database of image files 3 further includes an index database, and the **invoice** 4 server device further includes index load process for storing index pointers pointing to the compressed 6 documents into the index database.

1 4. The Web-based **invoice** viewing system as

2 claimed in claim 1, wherein the **invoice** presentation 3 device includes a presentation **applet** downloaded from 4 the **secure server** , the presentation **applet** launched within a Web browser window.

1 5. The Web-based **invoice** viewing system as

2 claimed in claim 1, wherein the **invoice** presentation 3 device includes **invoicing** classes downloaded from the 4 **secure server** , the **invoice** presentation device launched by the client browser application and running in a 6 frame distinct from a browser window.

1 6. The Web-based **invoice** viewing system as -51 SUBSTITUTE SHEET (RULE 26)

1 claimed in claim 1, wherein the **invoice** presentation 2 device further includes one or more dynamic 3 accumulator(s) for enabling the customer to add 4 numerical figures presented in the **invoice** document by highlighting the figures directly on the **invoice** 6 document at the client workstation.

1 7. The Web-based **invoice** viewing system as

2 claimed in claim 1, wherein the **invoice** presentation 3 device further automatically populates products and 4 date range fields associated with

a customer identifier, the products and date range fields listing 6 specific application services and time periods for 7 which **invoice** documents are available for presentation.

1 8. The Web-based **invoice** viewing system as

2 claimed in claim 1, wherein the **invoice** presentation 3 device further enables the customer to send a batch 4 printing request for a specific **invoice** document, wherein the **invoice** server device queues a batch 6 printing job in response to the batch printing request 7 for printing at the enterprise and delivery to the 8 customer.

1 9. The Web-based **invoice** viewing system as

2 claimed in claim 8, wherein the **invoice** presentation 3 device further generates a tracking number associated 4 with the batch printing request and enables the customer to confirm and track the current status of the 6 batch printing job.

1 10. The Web-based **invoice** viewing system as

2 claimed in claim 1, wherein the **invoice** presentation 3 device further enables the customer to fax a specific 2

-5

SUBSTITUTE SHEET (RULE 26)

4 **invoice** document which is presented at the client workstation to a customer specified location.

1 11. The Web-based **invoice** viewing system as

2 claimed in claim 1, wherein the **invoice** presentation 3 device further enables the customer to retrieve via the 4 integrated interface, information including product availability, scheduled systems availability, and 6 status information.

1 12. A method of remotely retrieving **invoice** 2 reports at a customer workstation having a client 3 browser application for enabling interactive Web-based 4 communications over an Internet between a customer and enterprise applications, the **invoice** reports relating 6 to network services provided to the customer, the 7 method comprising:

8 managing a client session over the Internet 9 by providing a **secure server** which supports a secure socket connection enabling encrypted communications 11 between the client browser application and the secure 12 server; 13 presenting at the customer workstation 14 **invoice** report selection options representing available **invoice** documents associated with the network services; 16 generating an **invoice** request message having 17 a customer selected option; 18 generating an **invoice** response message having 19 an **invoice** document data associated with the selected option in response to the **invoice** request message; 21 communicating the **invoice** response message to 22 the client browser application via the **secure server** ; 23 and 24 presenting the **invoice** document data at the

SUBSTITUTE SHEET (RULE 26) customer workstation.

1 13. The method according to claim 12,  
2 further comprising:

3 maintaining a database...files.

1 16. The method according to claim 12,  
2 wherein the method further comprises:

3 enabling accumulation of numerical figures 4 presented in the **invoice** document data by allowing the customer to highlight the numerical figures directly on 6 the **invoice** document data; and 7 presenting dynamically the accumulated 8 numerical figure at the client workstation as the 9 customer highlights the numerical figures.

1 17...

...19. The method according to claim 12,  
2 wherein the method further comprises:

3 enabling the customer at the customer  
4 workstation to fax an **invoice** document presented at the customer  
workstation to a location specified by the 6 customer.

1 20. The method according to claim 12,  
2 wherein the...

**5/3,K/10 (Item 10 from file: 349)**

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**MULTI-THREADED WEB BASED USER INBOX FOR REPORT MANAGEMENT**  
**BOITE AUX LETTRES UTILISATEUR MULTI-CHEMINEMENT BASEE SUR LE WEB DESTINEE A**  
**LA GESTION DE RAPPORTS**

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    Detailed Description  
    Claims

Detailed Description

... of telecommunications service entities via the World Wide Web (Web) .

Major telecommunications service entities presently provide for the presentation and dissemination of customer account and **network management** information to their customers predominantly through a Windows-based graphical user interface resident on a personal computer. Typically, service entity customers are enabled to directly...

...operate on many SUBSTITUTE SHEET (RULE 26) different operating platforms. For instance, MCI=s Service View platform (AMSV@) provides for the generation of toll free **network management** data, priced call detail or APerspective@ data for usage analysis and trending, and unpriced call detail or real-time ATrafficview@ data each of which requires...RULE 26) system with an inbox client application, which is typically launched by the client browser application.

The present invention also includes at least one **secure server** for managing client sessions over the Internet/Intranet network. The **secure server** supports secure socket connections enabling encrypted communications between the client browser application and the **secure server** . At the enterprise side, the application servers associated with different services typically generate customer specific data and place the data in the inbox server. The...customizing the report standards. The report data and the metadata associated with the report data may be downloaded to the client browser application via the **secure server** for generation of reports according to the metatdata description. The reports may then be presented to the customer at the client workstation.

The inbox server...

...3 is an illustrative example of a backplane architecture schematic viewed from a home page of the present invention; Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 5 is a diagram depicting the physical networkMCI Interact system architecture; Figure 6 is...

...may invoke various inbox services.

An overview of the Web-enabled integrated system The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system (AnMCI Interact@) such an integrated suite of Web-based applications provides...resident on a customer workstation 10 and provides customer access to the enterprise system, having one or more downloadable application objects directed to front-end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer requested...

...customer workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or call **management** functions.

The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview of the software...applications generally are integrated using a Abackplane@ services layer 12 which provides a set of services to the application objects that provide the front-end **business** logic. The backplane services layer 12 also manages the **launching** of the **application** objects. The networkMCI Interact common set of objects provide a set of services to each of the applications. The set of services include: 1) session management; 2) application **launch** ; 3) inter- **application** communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 3 is a diagrammatic example...

...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 250 providing, for example, a suite 252 of **network management** reporting applications including: MCI Traffic Monitor 252c; Call Manager 252f; a Network Manager 252e and Online **Invoice** 252i. Access to network functionality is also provided through Report Requester 252b, which provides a variety of detailed reports for the client/customer and a...252a for providing enhancements

and functionality to traditional e-mail communications.

#### SUBSTITUTE SHEET (RULE 26)

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to start, stop, and...Figure 2, it is understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer=s **network management** information and data. For example, the Services Inquiry server 36 includes communication with MCI=s Customer Service Management legacy platform SUBSTITUTE SHEET (RULE 26) (a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and 40(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported

generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request...

...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 30 and Legacy Mainframe Systems 40 which comprise the back-end **business** logic applications.

As illustrated in Figure 5, the present invention includes a double or complex firewall system that creates a Ademilitarized zone@ (DMZ) between two...reports, such as provided by MCI=s StarODS Server 33 in a variety of user selected formats.

All reporting is provided through a Report Requestor **GUI** application interface which support spreadsheet, a variety of graph and chart type, or both simultaneously. For example, the spreadsheet presentation allows for sorting by any...

...the inbox when a report is selected.

A common database may be maintained to hold the common configuration data which may be used by the **GUI** applications and by the mid-range servers. Such common data includes but are not limited to: customer security profiles, billing hierarchies ...actual identified sender. one technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each

transaction .

Another component of the nMCI Interact infrastructure includes order entry, which is supported by the present invention, the Order Entry (AStarOE@) service. The general categories...

...10) Call Manager. The order entry functionality is extended to additionally support 11) Event monitor; 12) Service Inquiry; 13) outbound Network Manager; and, 14) online **invoicing** .

The self-monitoring infrastructure component for nMCI Interact is the employment of mid-range servers that support SNMP alerts at the hardware level.

In addition...

...Monitor, and system administration applications. Further functionality integrated into the software architecture includes applications such as Outbound Network Manager, Call Manager, Service Inquiry and Online **invoicing** .

Inbox application

The present invention is directed to an inbox service, a horizontal service ...components and their relationship with other fulfilling systems of the networkMCI interact. The inbox system comprises an inbox client application 300 associated with the client **GUI** front-end for interacting with a customer, and a middle-tier inbox server 302 communicating with various Intranet applications (fulfilling servers) 304a, 304b.

The Web...

...customers. As shown in Figure 6, AStarWRS@ comprises the following components and messaging interfaces:

SUBSTITUTE SHEET (RULE 26)

1) those components associated with the client **GUI** front-end including a report requestor client application 308, a report viewer client application 310, and an inbox client application 300 as explained previously, which manager server 312 employs a Unix daemon that passively listens for connect requests from the **GUI** client applications and other back-end SUBSTITUTE SHEET (RULE 26) servers and deploys the TCP/IP protocol to receive and route requests and their responses...

...into a "metadata" format and are validated by a parser object built into a report manager proxy 3121 that services requests that arrive from the **GUI** front-end. If the errors are found in the metadata input, the Report manager 312 returns an error message to the requesting client. If the...

...understood that the report manager 312 server may manage reporting data for customer presentation from other back-end servers including, e.g., broadband, toll free **network management** , and event monitor servers,

etc. in order to present to a customer these types of billing/management data.

The report manager server additionally utilizes a...the system, the inbox proxy 302, uses the application program interfaces (APIs) provided by the AnetworkMCI Interact@ supporting different types of data transport mechanisms: synchronous **transaction** ; asynchronous **transaction** ; and, synchronous bulk transfer. The transport mechanisms SUBSTITUTE SHEET (RULE 26) are implemented as sockets message protocol, and the proxy handles its conversation processing on...

...metadata is required to be changed, it does not interfere with the information needed to display the reports included in the inbox.

The Inbox client **GUI** application

With regard to the front-end client **GUI** components, the above-mentioned inbox client application 300 functions as an interface between the SUBSTITUTE SHEET (RULE 26) client software and the inbox server 302...If the polling thread finds a new addition, the screen display is updated accordingly.

SUBSTITUTE SHEET (RULE 26)

The report requestor application 308 is a **GUI applet** enabling user interaction for managing reports and particularly includes processes supporting: the creation, deletion, and editing of the user's reports; the retrieval and display...

...herein, the report scheduler service maintains a list of requested reports for a given user, and forwards actual report requests to the appropriate middle-tier **servers** at the appropriate time. Additional functionality is provided to enable customers to manage their inventory, e.g., reschedule, change, or cancel (delete) report requests.

The report viewer application 310 is a **GUI applet** enabling a user to analyze and display the data and reports supplied from the fulfilling **servers** such as StarODS and ATVS@ 304b, and other systems such as broadband and toll free network manager 304a via the inbox 300, 302. Particularly, the...

...what further customization options the SUBSTITUTE SHEET (RULE 26) user has while viewing the report. It additionally includes a common report view by executing a **GUI applet** that is used for the display and graphing of report data and particularly, is provided with spreadsheet management 322 functionality that defines what operations may...

...it to display an image 324 or text 326 that may be passed by one of the applications in lieu of report data (e.g., **invoice** , broadband report, etc.) All reporting is provided through the report viewer interface which supports spreadsheet, a ...any arbitrary set of columns. The report viewer 310 is launched from the inbox client 300 when a report is selected and may also be **launched from applications** directly if a report is generated in real time.

By associating each set of report data which is downloaded via the inbox server 302 with...to see their sites, various connections between any two or more of these sites, and information about each specific site and circuit.

The StarWRS viewer **applet** remains open ...inbox on a local printer as indicated at steps 452 to 454, and to delete the report both from the client platform and the inbox **server** as indicated at steps 456 to 460.

Generally, the inbox may be separated into three sections: News, Report, Data. Each of these sections retrieves files...

...The InboxCmd object is launched by the Inbox object when the customer requests a specific SUBSTITUTE SHEET (RULE 26) report and it utilizes the list **transaction** data to retrieve the proper information. Once the InboxCmd object retrieves the data file for the report selected, the customer may either save the file or continue with the processing. When the processing resumes, the program determines from the list **transaction** data whether the file needs to be decompressed. Once the data file has been processed, if the data file is a csv report file type...

...report manager server, when report data or event notification data are available to be displayed at the client terminal. The application servers may utilize synchronous **transaction** for transferring files ...may be used for providing the services.

Service Used by client Used by Communication platform applets  
application transport servers mechanism Add No Yes Synchronous  
**transaction** Delete Yes No Synchronous List Yes No Bulk transfer  
SUBSTITUTE SHEET (RULE 26) Fetch Yes No Bulk transfer Update Yes No  
Synchronous **transaction**

#### Table I

Generally, communication within the inbox server, inbox client, and application servers are accomplished by messaging interface. All the service requests to the inbox...

...list delimited by < and > .

Additional un-parameterized binary data may be sent immediately following the list until the end of the data content of the **transaction** request or response.

Thus, the general form of the data content may be:

```
< param=val,param=val,param=< param=val,param=val> , param=val> binary...
file when
results file is non compressed SUBSTITUTE SHEET (RULE 26)
```

```
.mtd-zip metatdata file when
results file is
compressed
```

The Anotify report location@ message

**transaction** is used by the fulfilling servers to notify the report manager of the location in the inbox of a scheduled report which has been made...

...12345NRLA< ERROR=0,USERID=1234,USERRPTID=4321,REQUESTID= 38293> .

Add request from the StarOE application

SUBSTITUTE SHEET (RULE 26)

Another example of an add request **transaction** may be from the StarOE server. StarOE is another horizontal service supported by the AnetworkMCI Interact@ providing system administrative and order entry functionality for the...the stored procedures used in the present invention and their functional descriptions are provided in Appendix A, Table 15.

The list request and response message

**transactions** are described in Tables 10 and 11 of Appendix A respectively. An example of list request message format sent by the inbox client to the...Another example utilizing the update function of the inbox is an instance when a time-to-live value needs to be changed. Generally, each message **transaction** sent to the inbox server is tagged by the sender with a Atime-to-live,@ which determines how long the message may remain in the...server and proxy (302 and 302, at Figure 6) provides error codes denoting any kind of error condition which may have occurred when processing the **transaction** requests. The error codes are embedded with the response **transaction** messages sent to the requesting clients and servers. These error codes are described in detail in Tables 15 and 16 of Appendix A.

Typically, a...

...which are queued may also be altered to indicate new scheduled time for population in the inbox.

Time to live

As described previously, each message

**transaction** sent to the inbox are tagged by the sender with a Atime-to-live,@ which determines how long the message may remain in the inbox...the DMZ StarWeb Server(s) 24 to access the underlying message; a DMZ Web header 514 which is used to generate a cookie 511 and **transaction** type identifier 516 for managing the client/server session; a dispatcher header 515 which includes the target proxy identifier 520 associated with the particular type of **transaction** requested; proxy specific data 525 comprising the application specific metadata utilized by the target proxy to form the particular messages for the particular middle tier...mechanism 680 which may be one of four values indicating one of the SUBSTITUTE SHEET (RULE 26) following four message mechanisms and types:

1) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request, e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...indicates the status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction** . More complete error data may be included in the

specific error message returned.

The status field 690 is included to maintain consistency between requests and...

...get the request serviced. The application proxy supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

In performing the verification, translation and communication functions, the inbox proxy employs proxy.c, logfile.c, logfile.h, util.c, utils.h, protohdr.h...inputs processed data from the meta data descriptions as indicated at step 980, and send back the proxy header to the Dispatcher based on the **transaction** type, as indicated at step 983.

A determination is made at step 985 as to whether an error occurs when sending the proxy header.

If...

...995.

otherwise, as indicated at step 990, the proxy data obtained from the proxy application is sent to the dispatcher in accordance with the specified **transaction** mechanism. A determination is made at step 992 as to whether an error occurs when sending the proxy data back to the Dispatcher server. If...is 45 days days - before automatically purged from dbf TYPE= Designates Char (30) Yes e.g. Broadband, alarm type, priced, unpriced, report type, data exception, **invoice**, type, or flash MIR, CCID, priced type call detail, outage ENTPID= Enterprise ID Char (8) Yes As assigned in StarOE USERID= Designates Char (20) Yes...Report Flash Manager will determine for fulfilling servers.

TYPE= Designates Char (30) Yes e.g. Broadband, alarm type, priced, real-time, report type, data exception, **invoice**, type, or flash MIR, CCID, priced type call detail, outage ENTPID= Enterprise ID Char (8) Yes Enterprise ID USERID= User's ID Char (20) Yes...

Claim

... customer, the client browser application further 12 including an inbox client, the inbox client launched by 13 the client browser application; 14 at least one **secure server** for managing client sessions over the Internet/Intranet network, the 16 **secure server** supporting one or more first secure 17 socket connections enabling encrypted communication 18 between the client browser application and the secure 19 server; one or...

...RULE 26) I report data and the metadata associated with the report 2 data may be downloaded to the client browser 3 application via the **secure server** for generation of 4 reports according to the metadata description, and presentation of the reports to the customer at the 6 client workstation; and 7...

...polling thread, the 3 polling thread using one of the secure socket 4 connections for detecting an incoming message from the inbox server via the **secure server** , the polling thread 6 further starting a new thread upon detection of the 7 incoming message, wherein the new thread starts and 8 listens on...server, wherein when the customer selects an option, the inbox 6 client formulates and sends a request message to the 7 inbox server via the **secure server** .

1 18. The system as claimed in claim 16, wherein 2 the inbox client is implemented as an applet launched 3 from a Web browser...

...interactive Web-based communications 6 between the client workstation having a client browser 7 application, the client workstation identified with a 8 customer, and a **secure server** over one or more secure 9 socket connections, the secure socket connection enabling encrypted communication between the client 11 browser application and the **secure server** ; 12 receiving at a centralized inbox server, 13 customer specific data, including report data having a 14 metadata description for representing report standards and options...

...data and 19 notification data at the centralized inbox server, wherein the report data may be downloaded to the client 21 browser application via the **secure server** for 22 generation of reports according to the metatdata 23 description, and presentation of the reports to the 24 customer at the client workstation; generating...

5/3,K/11 (Item 11 from file: 349)

DIALOG(R) File 349:PCT Fulltext

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00632809

**SECURE SERVER ARCHITECTURE FOR WEB BASED DATA MANAGEMENT**  
**ARCHITECTURE DE SERVEUR SECURISEE POUR LA GESTION DE DONNEES BASEE SUR LE**  
**WEB**

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#### SECURE SERVER ARCHITECTURE FOR WEB BASED DATA MANAGEMENT

Fulltext Availability:

Detailed Description

Claims

##### Detailed Description

... employ HTTPS and a Web browser having Secure Sockets Layer (SSL) encryption, and they display Hypertext Markup Language (HTML) pages as a graphical user interface ( **GUI** ), and often include Java applets and Common Gateway Interface (CGI) programs for customer interaction.

For the enterprise, the use of off-the-shelf Web browsers... authentication procedure generally includes a logon object which prompts for and accepts the user's name and password.

The logon object then communicates the logon **transaction** to a server responsible for screening those remote users attempting to access services. once a remote user has been authenticated by the system of the

...

...The set of service subscription, then forms the user's entitlements for the services. Thus, for example, if a user subscribes to a toll free **network management** service, the user is entitled to access information regarding the service. on the other hand, if the user does not subscribe to the toll free...is an illustrative example of a backplane architecture schematic as invoked from a home page of the present system; Figure 3 illustrates an example client **GUI** presented to the client/customer as a browser Web page; Figure 4 is a diagrammatic overview of the software architecture of the enterprise Internet network...

...the present invention's process flow during logon, entitlement request/response, heartbeat transmissions and logoff procedures; Figure 12 is a data flow diagram for various **transactions** communicated in the system of the present invention; Figure 13(a) is a schematic illustration showing the message format passed between the Dispatcher server and...on a customer work station 10 and provides customer access to the enterprise system, having one or more downicable application objects directed to front end **business** logic as indicated at 11, one or more ... workstation 10

includes client software capable of providing a platform-independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for

example, inbox and reporting functions, and...

...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects which provide the front end **business** logic 11 and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as: 1) session management; 2) application launch ; 3) inter **application** communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 2 is an diagrammatic example...

...user interface objects 56a, b created and used by a respective application 54a, b for its own presentation purposes.

Figure 3 illustrates an example client **GUI** presented to the client/customer as a browser web page 60 providing, for example, a suite 70 of **network management** reporting applications, which may include:

Traffic Monitor 72; a Monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also...

...e-mail communications by providing access to user requested reports and bulk data. Additional network MCI Internet applications not illustrated in Figure 3 include Online **Invoice** , relating to electronic **invoicing** and Service Inquiry related to Trouble Ticket Management.

As shown in Figures 2 and 3, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to SUBSTITUTE SHEET (RULE...Figure 4, it is understood that each midrange server of suite 40 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 46 includes communication with MCI's Customer Service Management legacy platform 20(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 4, other legacy or host platforms 20(b), 20(c) and 20(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated host platforms 20(a)-(d) are illustrative only and it is understood other host platforms may be interpreted...

...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40

quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported

generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request...actual identified sender. one technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** . This technique employs SSL public-key cryptography with one-way hashing functions.

Another communications issue involving the secure communications link, is the trust associated with...the Secure web Server(s) 24 to access the underlying message; a DMZ Web header 114 which is used to generate a cookie 111 and **transaction** type identifier 116 for managing the client/server session; a dispatcher header 115 which includes the target proxy identifier 120 associated with the particular type of **transaction** requested; proxy specific data 125 including the application specific metadata utilized by the target proxy to form the particular messages for the particular middle tier...trusted source and allow applets to write to the local disk, print, read local files, and connect to a server other than the one that launches the **applet** . In order for an **applet** to be signed, the **applet** requires a digital certificate to be assigned to a JAR (Java ARchive) or equivalent archive file. As discussed previously, this digital certificate may be a software publisher certificate or the certificate used to verify the **server** as a trusted **server** during the SSL handshake process.

Figure 7 is a diagram which illustrates a security module design having clean separation from the browser specific implementations. The...  
SUBSTITUTE SHEET (RULE 26) take care in case of security exception  
Referring back to Figure 10, once the browser type has been confirmed, the logon **applet** checks for the name/password entry and instantiates a session object in step 292, communicating the name/password pair to the enterprise system. The session object sends a message containing the name/password to the StarOE **server** 49 for user validation in step 294.

When the user is properly authenticated by the server in step 296, another Web page which launches the...disclaimer acknowledgment 440 on the logon page 342. If the entered userid and password are not valid or if there were too many unsuccessful logon **transactions** , the logon object 342 communicates the appropriate message to the customer 340 as shown at 440. A logon object 342, typically an **applet** launched in the logon Web page connects to the Web **server** 344, for communicating a logon request to the system as shown at 442. The logon data, having an encrypted userid and password, is sent to...

...as illustrated at 446 together with the user application entitlements. The dispatcher 346 passes the data results obtained from the StarOE 348 to the Web **server** 344 as shown at 444, which passes the data back to the logon object 342 as shown at 442. The customer 340 is then notified ...string back to the backplane running on the client platform 10.

## SUBSTITUTE SHEET (RULE 26)

Furthermore, the cookie jar 352 is used to manage heartbeat **transactions**. Heartbeat **transactions**, as described above, are used to determine session continuity and to identify those processes which have died abnormally as a result of a process failure, system crash or a communications failure, for example.

During a customer session initialization, the cookie jar 352 generates a session id and sets up "heartbeat" **transactions** for the customer's session. Subsequently, a heartbeat request is typically sent from a process running on a client platform to the Web server 344...

...then sends the status back to 20- the client platform process, also as shown at 450.

When a customer wants to logoff, a logoff request **transaction** may be sent to the Web server 344.

The Web server 344 then connects to the cookie jar 352 and requests logoff for the session to the Web server 344, which returns the status to the client platform.

Other **transaction** requests are also sent via the Web server 344 and the cookie jar 352 as shown in Figure 12. Figure 12 is a data flow diagram for various **transactions** communicated in the system of the present invention. Typically, when a customer enters a mouse click on an application link as shown at 460, an SUBSTITUTE SHEET (RULE 26) appropriate **transaction** request stream is sent to the Web server as shown at 462. The Web server 344 typically decrypts the **transaction** stream and connects to the cookie jar 352 to check if a given session is still valid as shown at 464. The cookie jar 352...

...the Web server 344 as shown at 464. The Web server 344 on receipt of valid session connects to the dispatcher 346 and sends the **transaction** request as shown at 466. When the dispatcher 346 obtains the request, it may also connect to the cookie jar 352 to validate the session...

...The dispatcher 346, upon receiving the valid session connects to a targeted application server or proxy 354, which may include StarOE, and sends the request **transaction** to the target as shown at 470. The server or proxy 354 processes the request and sends back the response as stream of data which...

...the backplane and the applications may send messages and requests to back-end services. The client communications unit includes a client session unit and a **transactions** unit. The client session unit and the **transactions** unit comprise classes used by client applications to create objects that handle communications to the various application proxies and/or servers. Generally, the entire communications...the overall process.

In the preferred embodiment, a single cookie typically suffices for the

entire session. Alternately, a new cookie may be generated on each **transaction** for added security. Moreover, the cookie jar may be shared between the multiple physical servers in case of a failure of one server. This mechanism...

...predefined period, e.g., 1 minute to the Web server to "renew" the session key (or record). The Web server in turn makes a heartbeat **transaction** request to the cookie jar.

Upon receipt of the request, the cookie jar service "marks" the session record with a time stamp indicating SUBSTITUTE SHEET...delta is greater than a predetermined amount of time, the cookie jar service clears the session record, effectively making a session key dead. Any subsequent **transactions** received with a dead session key, i.e., nonexistent in the cookie jar, are forbidden access through the Firewall.

The heartbeat messages are typically enabled...

...66 to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 40 and Legacy Mainframe Systems 20 which comprise the back end **business** logic applications.

As illustrated in Figure 5, the present invention includes a double or complex firewall system SUBSTITUTE SHEET (RULE 26) that creates a "demilitarized...indicates the message type/mechanism 180 which may be one of four values indicating one of the following four message mechanisms and types:

1) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request, e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...

...indicates the status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction** . More complete error data SUBSTITUTE SHEET (...get the request serviced. The application proxy supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

Particularly, in performing the verification, translation and communication functions, the Report Manager server, the Report Scheduler server and Inbox server proxies each employ front...

...data to store.

After a message is received, the parser object is created in the RMDispatcher.c object which is a file which includes the **business** logic for handling metadata messages at the back-end. It uses the services of an RMParse class. Upon determining that the client has - sent a...logs into a specific application, the application server retrieves specific and detailed user entitlements for that application from the StarOE server 49 in a separate **transaction** . These entitlements may be different from application to application. Thus, a user may have read and write privileges with

## Claim

... services linking 4 said dispatcher server to a plurality of system resources over said communications network, said 6 plurality of system resources providing communications 7 **network management** capabilities for said enterprise 8 client, said system resources responsive to service 9 requests from said enterprise client to generate client data or instructions relating...to a plurality of application 3 servers within said communications network, said 4 application servers communicating with a plurality of system resources to provide communications **network** 6 **management** capabilities for said enterprise clients.

1- 12. The system for securing an enterprise 2 communications network ...access and initiating a 11 secure session with a client browser over the Internet; 12 (c) encrypting communications between said 13 client browser and said **secure server** with a first 14 security protocol; (d) routing a request for client 16 authentication and a set of client entitlements from 17 said **secure server** to a second preselected address at 18 log-on via a second set of routing rules, wherein said 19 client authentication and client and entitlements...

5/3,K/12 (Item 12 from file: 349)

DIALOG(R) File 349:PCT Fulltext  
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00632801

INTEGRATED BUSINESS SYSTEM FOR WEB BASED TELECOMMUNICATIONS MANAGEMENT  
SYSTEME D'ECHANGES COMMERCIAUX INTEGRES POUR LA GESTION DE  
TELECOMMUNICATIONS SUR LE WEB

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## **INTEGRATED BUSINESS SYSTEM FOR WEB BASED TELECOMMUNICATIONS MANAGEMENT**

Fulltext Availability:

Detailed Description

Claims

### English Abstract

The specification discloses a method of doing **business** over the public Internet, particularly, a method which enables access to legacy management tools used by a telecommunications enterprise in the management of the enterprise **business** to the enterprise customer, to enable the customer to more effectively manage the **business** conducted by the customer through the enterprise, this access being provided over the public Internet. This method of doing **business** is accomplished with one or more secure web servers which manage one or more secure client sessions over the Internet, each web server supporting secure...

### Detailed Description

#### **INTEGRATED BUSINESS SYSTEM FOR WEB BASED TELECOMMUNICATIONS MANAGEMENT**

The present invention relates generally to method of doing **business** over the public Internet, and, particularly, to providing enterprise management tools to customers of a telecommunications service provider over the Internet.

The public Internet was...

...a delivery medium for all types of content over the World Wide Web (Web) and commercial enterprises entered this segment of the Internet to do **business** over the rapidly developing Web environment. Initial methods of doing **business** were focused on using the Web as an alternate to existing direct mail, magazine or television methods of doing **business** , in which goods were advertised and sold, or content was delivered via the Web in a manner similar to existing methods of doing **business** .

During this same period of time, the telecommunications industry began to provide a greater percentage of the Internet capacity, both in terms of high speed lines between web sites, and between the individual consumers and small **business** who connect to

the Web through a local telephone Central Office (CO) and an Internet service provider.

Simultaneously, the telecommunications industry recognized, that its larger customer were 45 interested in managing portions of their own **business** rovided by the telecommunications enterprise, and Egan to make some of their management tools available to their customers. In these conventional customer enabled management systems...oyed an MCI ServiceView ("MSVII) platform comprisin a number of independent legacy systems enabling gial-up connectivity for those customers desiring to obtain the following **network management** service and reporting data pertaining to their telecommunications networks: priced call detail data and reporting; toll-free network manager "800NM" call routing data; outbound **network management** data; trouble ticket information; fault manager alarms.

Limited interactive toll free network control is additionally supported whereby customers ma change the configuration of their toll...

...providing reports on the performance of customers' Broadban (data) networks.

More particularly, MCI's ServiceView latform ("MSV") provides for the generation of Toll 55 ~ree **Network Management** data, priced call detail Piperspective") data for usa e analysis and trending, each of which requires a dif9erent reporting mechanism due to the nature of...

...Administration System (NAS), and is developing a second part, known as Service Request System (SRS).

The NAS program uses a personal computer, a Windows based **GUI** and analog dial-u access at 9.6 Kbps to ...provides several legacy systems via the Insite service offerings, including Insite PC, Insite ACT and is in the process of developing the Sprint Insite Executive **network management** program, all making use of a customers personal computer and a dial-up connection. Sprint also announced on Septemner 17, 1996, the Sprint InTouch(SM...standards or signal standards, thereby providing a measure of platform independence for the customer.

Furthermore, an Intranet/Internet/Web-based reporting system provides a common **GUI** for the customer enabling both report requesting, customizing, scheduling and viewing of various types of data from different back-end telecommunications service and applications at...  
...s management tools to facilitate the integration of the customer with the enterprise. This may be done by enabling access to the enterprise's telecommunications **network management** services over the public Internet. The assignee of the present invention currently provides a number of independent legacy or host systems to provide customers with...

...to their telecommunications networks: Priced Reporting (formerly Perspective), for priced call data and reporting, and TrafficView for unpriced call detail data and repqrsting; Toll-Free **Network Management** (TFNM) (previously 800 Network Manager), Call Manager, and Outbound

Network Manager for command and control of network switching; BroadbandView, Broadband SNMP (previousl H erScope) and...

...and alarm data; Service Inquiry (preiously Direct Dis atch) for trouble ticket management; Real-Time Monitor ~or near real time call detail data; ClientView for **invoice** data.

Limited interactive toll free network control is additionally supported whereby customers may change the configuration of their toll-free networks and "virtual" networks, i.e., Vnet networks.

45 The present invention is directed to a Web based system for doing **business** that utilizes an integrated customer interface system for telecommunications **network management** . The customer interface system is provided with a graphical user 50 interface for enabling a user to interact with one or more telecommunications services provided...

...the enterprise to the customer. While the present invention is useful for a wide range of commercial activity, ranging from a few thousand calls or **transactions** a month to over a million per montlf, it 60 is articularly desirable for activity ranging from , EOO to 200,000 **transactions** or callstEer month.

In the preferred embodiment, e telecommunications products and services delivered to a client workstation having the integrated customer 65 interface include: 1...call detail statistics and call detail data pertaining to their special service network usage, e.g., 00/8xx toll-free networks; 4) a toll-free **network management** system enabling customers to define their own 800/8xx toll free number routing plans via the Web/Internet, enabling customers to change and modify their...

...routing plans, and, temporarily change the percent allocation of traffic for a particular 800/8xx toll free number based on certain criteria; 5) an outbound **network management** system enabling customers to manage and track features and services associated with their virtual networks ("Vnet") including management of calling party number orders, dialing plan...

...performance information relating to the circuits which comprise a customer's Broadband data network, e g., frame-relay, thus, allowing customers to ma-e informed **network management** decisions in controlling their **business** telecommunications networks; 7) a trouble ticket tool enabling a customer to open and monitor trouble .

tickets relating to network events on an enterprise network; 8) a Web-based **invoice** re)orting system allowing the customers access to t~eir billing and **invoice** reports associated with network services provided to a customer; 9) a web-based call manager service enabling call center customers to control 45 delivery of...

...and 12) an on-line E-Billing 55 electronic commerce tool that will allow selected networkMCI Interact customers to receive, analyze, and pc~y

their **invoice** (s) over the public Internet. On Line E-Billing provides a variety of Internet-based billing features that includes electronic **invoioe** 60 presentment, **invoice** analysis and electronic bill payment, all from a single point of customer authentication.

Integrated within the customer interface system is an application backplane unit for...with one another and with the backplane unit.

Thus, in accordance with the principles of the invention, there is provided an integrated system for conducting **business** over the Internet by providing, one or more enterprise management tools to the enterprise customers, said management tools accessible from a client workstation employing a...

...associated with a customer and capable of receiving web pages from the enterprise which enable access to the enterprise management tools. This method of doing **business** is accomplished with one or more secure web servers which manage one or more secure client sessions over the Internet, each web server supporting secure...

...tool applications to provide associate management capabilities to the customer.

The messages include:

i) requests for information pertainin  
t% to a

50 customer's telecommunications **business** with e enterprise; or, ii)  
command and control directives for modifying a customer's  
telecommunications network assets; 55 wherein the remote  
telecommunications management tool application...

...said one or more web servers for secure downloading to the customer workstation for display via said integrated 60 interface.

Advantageously, this method of doing **business** obviates many of the installation and configuration problems involved with initial setup and configuration of a dial-up customer workstation, since the custom application required...

...to browser compatibility issues.

The present invention further enables access to legacy management tools used by enterprise management in the conduct of the entergrise **business** to the enterprise customer, to ena le the customer to more effectively manage the **business** conducted by the customer through the enterprise, this access being provided over the public Internet.

The present invention provides a single point of access for changes they have requested.

The present invention also provides an integrated E-Billing ~ystem for doing **business** in which customers may view unpriced and priced telecommunication call data, to view electronically generated **invoices** for the telecommunication service

provided, and to pay for these services with an E Billing electronic fund transfer.

The present invention also uses the Internet...

...and to leverage the web technology of the present invention by giving customers the option of receiving, analyzing, and paying their network MCI One **invoice** over the public Internet. The present invention provides an "intelligent, navigable **invoice**" where customers and users can drill down from summary level information to specific site and service level detail.

This invention further provides enterprise-wide customer...

...create a cost-effective, 24 hour a day, 7 day a week virtual communications center for the enterprise customers, thereby providing a competitive advantages for **business** users of the invention. Using the present invention, customers can easily and conveniently, manage enterprise-wide and individual telecom services 45 - anywhere, anytime and online...

...billing and reporting, universal messaging, order entry and provisioning, product and service training, and customer care.

60 Further, the present invention defines a new **business** model by utilizing the Internet as a medium for operating and managing mission-critical communications operations, by creating a more convenient way for customers...

...links the enterprise front-and back-office processes to more effectively serve customers of the enterprise.

Because customers have the option to self-serve their **business** functions online, the enterprise sales resources are able to play a more consultative role and respond to communications conditions that require more complex management...service that allows Web-users to make a PC-to-phone connection over the Internet; E Billing and Reporting, which allows customers to receive electronic **invoices** and reports, to remit payment electronically; and to provide custom views and analysis of billing records; networkMCI BroadbandView, a Web-based traffic and reporting tool...

...50 offices worldwide. The manager is responsible for sorting and tracking expenses for all 50 locations and for all the company's services. The paper **invoices** can sometimes exceed hundreds of pages. With electronic billing the manager will no longer have to wait to receive a paper **invoice** in the mail. Instead, real-time e-bills will be available on a secure Web site, with the ability to manipulate and view the data in many different formats - by service, by location, etc.

After review, the manager is able to remit **invoices** electronically.

The present invention uses Java technology to optimize computing

resources and network bandwidth and deliver information to the user desktop quickly and efficiently...architectural overview 50 of the StarOE order entry component of the nMCI Interact system; Figure 7(a) is a diagram depicting the execution of a **transaction** by the Service Inquiry application server with each bubble representing a 55 separate thread.

Figure 8 is an input process flow diagram, illustrating inputs...ONM system 200 of the invention; Figures 29(a)-29(p) illustrate various examples of ONM web page screen dialogs enabling user interaction with Outbound **Network management** system.

Figure 30 is a detailed block diagram depicting the physical architecture of the Broadband reporting system component of the present invention; Figure 31 illustrates...displayed for providing the user with the ability to view, create, delete and edit ACD collectors; Figure 51 illustrates an architectural schematic of the online **invoicing** system 1300 component of nMCI Interact; Figure 52 is a flow diagram illustrating an online **invoicing** process flow; Figure 53(a) is a sample criteria screen launched from the nMCI Interact home page; Figure 53(b) is a sample screen displaying a list of **invoice** reports; Figure 54 is a sample screen displaying an **invoice** document generated by the online **invoicing** system component of the invention; 45 Figure 55 is a flow diagram illustrating an online **invoicing** back-end server process flow 1400 during document indexing and storing; Figure 56 is a flow diagram illustrating an online **invoicing** back-end server process flow when 50 responding to client requests for document presentation; Figure 57 is a schematic illustration of the message format...  
...present invention's process flow during logon, entitlement request/response, heartbeat transmissions and logoff procedures; and Figure 59 is a data flow diagram for various **transactions** communicated in the system of the present invention.

Figure 60 is a diagram depicting the physical network architecture of the nMCI Interact system of the...

...proxy back to the Dispatcher server.

The present invention is a Web-based, telecommunications network application delivery system for delivering an integrated suite of customer **network management** tools to customers of telecommunications using a Web browser paradigm. The service provided herein and provided by the assignee of the present invention, is collectively referred to as the networkMCI Interact system ("nMCI Interact"). Such an...

...work station 20 and provides p , 45 customer access to the enterprise system, having one or more downloadable application objects 10 directed to front end **business** logic and application services, a backplane service layer 12 for managing sessions, one or more presentation services objects for the 50 presentation of telecom **network management** options and customer requested telecommunications network management data in a browser recognizable format, and a customer supplied browser for

presentation of customer options and...

...20 is client software capable of providing 4 platform-independent, browser-base, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, Service Inquiry, Toll Free **Network Management** ("TFNM") or Call Manager ("CM") functions. The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure ...generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects which provide the front end **business** logic and manages their launch.

50 As will be described, each of the nMCI Internet suite of network management applications implements a set of...

...a model view controller (MVC) framework. The primary common object services 60 for each of the suite of applications include:

graphical user interface ( **GUI** ); application launch; window navigation among applications; inter application communications; printing; user identity, session management, authentication, and entitlements; data import and export; logging and...Figure 2, it is understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present 55 invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 40(a). Such **network management** and customer network data is additionally accessible-by authorized MCI management personnel. As shown in 60 Figure 2, other legacy platforms 40(b), 40(c) and (d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only and

- I

it is understood other legacy platforms may be...AS mentioned, one component of the nMCI

Interact system is the client-tier software component which provides the integrated and unified interface to each the telecommunications **network management** services available to a user. As shown in Figure 3, the system of the present invention implements an "application backplane" 12, a single object which...including classes for initiating a session, have been already downloaded, for example, from a previous session, the steps 62, 64, 66 are skipped.

The logon **applet** checks for the name/password entry and instantiates a session object in step 72, communicating the name/password pair. The session object sends a message containing the name/password to a remote **server** for user validation in step 74. When the user is properly authenticated by the **server** in step 76, another Web page having backplane object is downloaded in steps 71 80, 84. This page is referred to as a home...backplane's deregisterAppo method.

Then a user typically requests logoff via menu, close box, etc. When such a request is received the backplane sends Logoff **transaction** to the Web Server.

The backplane closes toolbar and directs the Web 55 browser to logon URL. Then the backplane exits.

As further shown in...

...browser window in step 132.

If a product overview hypertext is selected in step 134, a URL pertaining to the product's features will be **launched** in a new browser window in step 136. If a user selects home in step 138, the home page will be redisplayed in step 139...their organization.

By utilizing the system of the present invention, customers no longer have to place manual calls to order entry hubs when requesting order **transactions**. For example, users may be added to the system without an enterprise's support team intervention. In sum, customers may manage their ...in a user platform having a Web browser, hereinafter referred to as a StarOE client application. The StarOE server 39 processes a number of **transaction** requests relating to authentication and entitlements, from other 50 application services, both from the client and the application **server** 158 sides of the network. In addition, the StarOE **server** 39 receives **transaction** requests from the StarOE client application. The **transactions** are typically message driven and comprise 55 requesting **transactions** and response **transactions**.

The StarOE **server** 39 responds to the message requests by formulating **transaction** responses and transmitting them to the requesting **servers** and clients.

#### 60 The StarOE client application

The StarOE client application 154 is one of the client browser applications running in the Web browser 14, and provides a Web-based GUI interface implemented accordingly and conforming to the networkMCI Interact GUI interface standard for the integrated suite of customer network management and report applications, as described herein. As described, the StarOE client application 154 is launched at the client initiation by the backplane object and generally includes Java applications and applets for providing a common Web based GUI for interacting with customers at the front end side.

When a customer launches the StarOE application from the home page, the

main window as illustrated...that user. The main window 1500 having the menu oKions 1506 and the toolbar 1504 is then presente . The StarOE client application then sends a **transaction** message "get 50 StarOE security" including the user id, enterprise id, and the StarOE application code in the message. The StarOE server 39 returns racf...

...is an external admin, a member of an account team, an internal admin, or a 55 customer support admin, for example. If the user that **launches** the StarOE **application** is an external admin, the user list is displayed immediately since external administrators may view only one enterprise.. For external administrators, an enterprise name is 60 retrieved from the StarOE **server** 39 by sending and receiving a "get user enterprise list" **transaction** request and response.

If the user is not an external administrator, then a dialog is presented for the user to select which enterprise to view. When user selects an enterprise to view, a "get user list,,, **transaction** message having enterprise id is sent to the StarOE server 39 to retrieve a list of user ids, a list of applications for each user...

...each application, and repqrting types for StarWRS (e.g., Toll Free, Vnet, Vision, CVNS). The client application also sends a " g~,t ap~lication list" **transaction** message to retrieve rom. the StarOE server 39 a list of application codes, description, and an application array ition. The user list is then displayed...besides performing various order entry and administrative functions for the TFNM application, other application services, including reporting for VNET, Vision, Broadband, Call 50 Manager, and **invoice** reporting may be ordered and the Security information pertaining to each application may be modified in a similar manner.

StarOE client application 154 parti,cularly...client application 154 executed at the customer workstation 20.

Referring to Figure 7, a process running - in a StarOE client application process 154 sends 60 **transaction** request messages via the nMCI Interact infrastructure, comprising, e.g., the web server cluster 24 and a dis atcher server 26 (Figure 2), to the OE server 39. Ne StarOE server 39 res onds to requests by searching the security profile ~or the information requested, formulating appropriate **transaction** response messages and transmitting them back to the requesting process. As an example, other during the login procedure, the client login process formulates a **transaction** message including a user name/password and a validation request for a given customer. The StarOE server 39 looks for the matching name/password pair...given customer is stored in customer profile database 160 located with the StarOE server. When the backplane requests via 50 TC!P/IP the entitlement **transaction** , for example, in a "get application list" request message, the,security module retrieves and transmits back via TCP/IP to the backplane the list of authorized applications accessible bK,a iven customer in a **transaction** 55 response. T bgackplane uses the list to determine which buttons on the "networkMCI Interact" home page should be activated, thus controlling access to products...will now be described.in detai , the StarWRS

reportin system.200 comprises the following components ang messaging interfaces:

1) those components associated with the Client **GUI** application front end including a report requestor client application 212, a report viewer client application 215 and, an Inbox client application 210 which implement the...

...metadata used for displaying reports. In the referred embodiment, the RM server 250 employs a Unix aemon that passively listens for connect requests from the **GUI** client applications and other back-end servers and deplo s the TCP/IP protocol to receive and 55 route requests an~ their responses. Particularly, Unix...

...translated into a "metadatall format and validated by a parser object built into a report manager proxy 250, that services requests that arrive from the **GUI** front-end. If the errors are found in the metadata input, the RM 250 will return an error messa e to the requesting client. if... back-end and legacy servers including, e.g., Event Monitor and Service Inquiry servers, etc., in order to present to a customer these types of **network management** and reporting data.

The report manager server additionally utilizes a database 258, such as provided by Informix, to provide accounting of metadata and user report ...Requestor client application it needs 50 to get information (e.g., Pick Lists) from the StarOE server 39.

With regard to the front-end client **GUI** components, the above-mentioned Inbox client application 210 functions as an interface between the 55 c lent software and the Inbox server 270 for presenting...for new messages, and starts a new thread on a new connection when a new message is detected. In this way, multiple messages may be **downloaded** simultaneously.

The Report Requestor appli,cation 212 is a client application enabling user interaction for managing reports and particularly includes processes supporting: the creation, deletion...

...provi ed to enable customers to manage their inventory, e.g., reschedule, change, or cancel (delete) report requests.

The Report Viewer application 215 is a **GUI Applet** enabling a user to analyze and display the data and reports supplied from the fulfilling **servers** such as ODS 400, Traffic View (TVS) 500, and other systems such as Broadband and toll free network manager.

Particularly, all reporting is provided through...

...of display, and what further customization options the 1~ser has while viewing the report. It additionally includes a common report view by executing a **GUI applet** that is used for the display and graphing of 60 report data and particularly, is provide with spreadsheet management functionality that defines what 9perations can image or text that may be assed by one of the applications in lieu of report ata (e.g., **Invoice** ,

Broadband report, etc.) By associatin each set of report data which is downloaded via the Inbox server 270 with a "metadata" report description object, reports...an existing report. From this screen and related re ort building dialog boxes, all of the initial vaTues for retrieving the MetaData, customization options and **GUI** builder options from the report manager server 250 necessary to build (edit) a report are provided in accordance with the user's entitlements. Thus, in...1604 presents the 45 user with the ollowin selectable access types: dial 1, card, dedicated, 809 Remote Access, Direct Dial fax, store/forward fax, 800 **Business** line (highlighted in the Fi ure 12(f)), 800 wide area telecommunications service, 900 dedicated, 800 Network Call Redirect, 50 local, cellular.

Referring back to...table status field with a status "C" indicating completion, as indicated at step 391.

Once the Report Manager has updated the status field, the RM **server** 250 then adds the report to the Inbox **server** , as indicated at step 393.

In an example metadata message indicating to the Inbox **server** that an unpriced TVS fulfilling **server** report is available, the RM **server** supplies a metadata "A" message to the Inbox indicating the FTP file location. Via the report viewer, the.report is now available for viewing, downloading...

...a data tab 1514. Selection of the reports tab 1513 enables the retrieval of both a data file and a metadata file from the Inbox **Server** corresponding to those reports that have been run and available for 45 customer viewing. Information pl~ovided for display by the ...to the customer the various type of reports received at the Inbox. Preferably, 411 Report Requestor and Report Viewer aEplications communicate 60 with the RM **server** 250 throug the use of the common object communication classes.

It should be understood that fulfilling **servers** such as the Broadband, and Toll Free Network Manager 500, and StarODS 400, Report Scheduler **server** , and any other back-end or fulfilling **servers** (not shown), send report results and event notifications to the inbox **server** 270. The fulfilling **servers** , and Report Manager **server** may communicate to the inbox **server** 270 by making requests to the inbox proxy 270'. The proxy, generally waits for a request from an application and then services the request.

The...

...proxyls main res onsibility is to process req~ests by either handlinpg( them internally within the inbox proxy 270, or forwarding them to the inbox **server** 270, and then responding back to the client (i.e., the fulfilling **servers** in this case).

In order to maintain secure connectivity throughout the system, the inbox proxy 270, uses the application program interfaces (APIs) provided by the "networkMCI Interact" supporting different types of data-transport mechanisms: synchronous **transaction** ; asynchronous **transaction** ; and, synchronous bulk transfer The transport mechanisms are implemented as

soc~ets message protocol, and the proxK handles its conversation processing on a t read or process per conversation asis for servicing multiple simultaneous clients.

As an alternative to the transports above, the inbox **server** 270 offers direct File Transport Protocol (FTP)i"put" for very large transfers in order to allev ate some of the network **server** loads. The fulfilling **servers** 400, 500 with large data.transfers typicall use the common shareware compression format ZIP whicK is also PKZIP compatible. Alternately, the fulfilling **servers** 400, 500 distributing information via the inbox may "put" the data to the inbox and defer zipping until after the inbox receives the data.

As described, the fulfilling **servers** , when placing the data in the inbox, notify the report manager **server** 250 they are adding new data in the inbox. The report manager 250,then retrieves and FTPs the appropriate metadata associated with the new data...

...inbox of the new additions to the inbox, i.e., the new data and the associated metadata. The metadata is then stored in the inbox **server** database 273 along with the report results.

Thus, if the metadata is req~iired to be changed, it 45 does not interfere with the information needed to display the reports included in the inbox.

Particularly, as shown in Figure 16, the Inbox **server** 270 interface with the Inbox Client 210 supports messaging that enables the User to remove an 50 item from the Inbox, e.g., delete a...

...Enterprise and User ID as well as other associated reports. The parameters used in the metadata messaging between the Inbox client and the 55 Inbox **server** incl'de, particularly, the List "L" message which is a synchronous request for a list of all Inbox items for a specific user. The Inbox...

...may simply select to save the report and exit. In this case, the ARD message is sent from the Report Requestor client to the RM **server** and is saved in the RM inventory database for subsequent execution. Consequently, the report is flagged as incomplete in the User-table and may not...

...messaging is used throughout the various components of the StarWRS system 200. The format of an interface message that is sent to the Repqt Scheduler **server** is identical to the format as the interface,messaging format returned by the.RS **server** 260. Thus in t e case of automatic recurring reports, a variation of the process outlined in Figure 11(b) occurs at step 360, wherebK the ARD request is instead sent from the report sc eduler to the fulfilling **server** at the programmed frequency.

Particularly, when a report is required to be run, the Report scheduler **server** 260 (Figure 10) sends an ARD request to the fulfilling **server** in a metadata message format having parameters. Upon processing of the metadata message, the fulfilling **server** will respond to the report

Scheduler with an acknowledgment of the command, and the process outlined in Figures 11(b) and 11(c) is executed.

The Report Scheduler **server** 260 is additionally capable of updating the User report status table and, preferably, is provided with---a tracking mechanism for tracking the scheduling of user...detail records from external network switches, translates and sorts the data into billable records for input into two systems: a Commercial Billing system ("NCBS") mainframe **server** process 410 for pricing the records at tariff for customers subscribing to, e.g., MCI's VNET and Vision telecommunications products; and, a toll-free billing **server** process 420 for pricing the records at tariff for customers subscribing to toll free telecommunications products. A common data gateway component 430 including a mainframe...data translations, data grouping, data routing, and data logging functions. According to a dimension table based on data within selected BDRs, the harvesting process applies **business** rules to the 55 data, cleanses the data, transforms the data, creates load files for DataMarts and compresses files for storage in the DataMarts. The available for reporting through the NMCI Interact StarWRS reporting system 200.

Additionally, the ODS component 450 includes a 55 Decision Support **Server** ("DSS") reporting engine component 475 that performs the following functions:

1) receives various customer report requests from the StarWRS GUI Report Requestor component and accordingly generates database queries; 2) routes the query to the appropriate data marts 470, data warehouse or operational data store; and, 3) responds to the requestor with a formatted result set. The DSS **server** 475 may also perform cost estimation, agent scheduling, workflow broadcasting interface, and **transaction** logging functions. In the preferred embodiment, the DSS 475 is a cluster of DEC (Digital Equipment Corp.) UNIX 8400 **servers** running Information Advantage® software accessing an Informix database, e.g., Informix Dynamic **Server** V.7.3. database product, distributed across multiple Data Marts.

In accordance with the invention, the primary function of the DSS 475 is to generate...

...and sends the request to the DSS as a Talarian message with the Report Manager 250 maintaining the Talarian Sender program, and the Decision Support **Server** 475 45 maintaining the Talarian Receiver program. Messages are sent with guaranteed message delivery ("GMD"), thus assuring all request data sent by RM is received...

...by which Talarian receivers can subscribe. Conversely, message subjects describe messages by which Talarian senders publish.

55 In the application programming interface "API", the RM **server** 250 publishes the message to the Decision Support **Server** in response to its receipt of a report request. Similarly, a DSS/Inbox API is provided to manage FTP transmission of completed 60 customer report...

...of all messaging operations. In addition to the tokenized character string request message which specifies report type, filters, and any customer request-specific information, RM **server** provides additional fields as part of the Talarian request message including: a Corp-ID, Priority, and RequestID.

Corp-ID allows the DSS to route the...user defined list) from StarWRS Report manager, as indicated at step 605. This process entails invoking a Communication Manager object to communicate with the RM **server** in order to obtain a SURL metadata message, as described.

Next, as indicated at step 610, the Report inventory for the specific user is loaded...if the report is successfully generated. As indicated at step 668, the \*.csv report/data file is then /I pushed", implementing FTP, to the StarODS **server** 's directory on the Inbox **server** 270.

Finally, as indicated at step 670, once the file has been successfully transferred to the Priced reporting directory on the Inbox **server** , and the request status table 494 appropriately updated at step 675, an NRL message is sent to the RM **Server** 250 notifying it of the report file name and location in the Inbox, requestor information, and if the transfer was successful. This is accomplished by...

...marked as complete. After the control process updates the report status table, the Report Manager is notified that the report is complete and the Inbox **server** notifies the user that report is ready.

A user may subsequently retrieve the report by clicking on the message center icon 81 from the home...

...viewer are downloaded to the user (client) workstation.

TVs

As mentioned, the traffic view system ("TVS") 500 of the present invention comprises a Traffic View **Server** 550 which functions to store network call detail records (CDRs) and statistics, generate reports and deliver reports and/or call detail to the customer via the StarWRS Web Reporting System, and, supplies on-line customer access to call detail and hourly statistics that aid the customer in **Network management** , call center **management** and customer calling pattern analysis. For real time (unpi~iced) data, statistics are generated for the following totals: minutes, attemp~s, completes, incompletes, 45 other, dto (direct termination overflow), snort calls, didn't wait, didn't answer, tcc, and equipment failures.

The process by which the TVS **server** 550 gets data is now explained in greater detail with reference 50 to Figures 18 and 19. As shown, call records are created b~ a...As shown in Figure 18, in the preferred embodiment, initial customer provisionin~ occurs at either the Corporate Order Entry system 23 (CORE) or the StarOE **server** 285 component of MCI Interact.

Particularly, CORE 223 transmits daily to the TVS **server** 550 via

Network Data Mover (NDM) files which comprise information about new reports for TVS to create, and where to send those reports, e.g., FAX, E Mail, or US Mail. In the NMCI Interact TrafficView **Server** 550, a CORE FEED process 523 provisions reports into a reference database 551, and sets up scheduled 45 reports to work on the next boundary...GSE 504 via a TCP/IP interface. In the ~referred embodiment, the content and format of an "or er entry" message generated by the TVS **server** for requesting unpriced traffic data from the GSE is provided in Appendix H. In accordance with this messaging, the GSE selects all TCR's for TVS enabled customers and places them in a SAVE storage queue, e.g., Versant or Talarian, for subsequent distribution to the TVS **server** .

As further shown in Figure 18, an input feed from the calling area database component 508 ("CADB") provides the TVS **server** 550 with reference data including state and country information for mapping NPA/NXX (Numbering Plan Area/ Number Exchange) to city name and state code, and, for mapping country codes to country names. Data is transported from the CADB database 518 to the TVS **server** via a network data mover ("NDM") or FTP via interface 519.

A further input feed from the Global Information Repository "GIR" component 511 provides the TVS **server** with International toll-free number terminations on a periodic basis.

From the circuit order management system (11COMS") component 515, TVS receives three NDM feeds:

1...the StarWRS system. The new customer hierarchy information is extracted b~ the CORE system 223, and is available for picku by t e 60 StarOE **server** 285 via messaging interface 237. The StarOE **server** 285 then messages the Traffic View **Server** 550 in real time via TCP/IP that the number has been added for Unpriced Reporting. The TVS additionally messages the GSE component 505 in...CDRs for these numbers.

Figure 21 illustrates a generalized block diagram detailing the internal TVS data acquisition processes. As shown in Figure 21, a TVS **server** "GSE TCR RCVR" process 564 receives a group of TCR reco-rds -from the GSE component 504. The GSE - TCR-RCVR process 564 inserts that...following manner:

First, as the reference database 551 contains information on which toll-free number belongs in which 50 CDR database associated with the TVS **server** , records are grouped for each CDR database 561a,561b,...,561n, to which they belong. The reference database 551 additionally flags which numbers are to have...by two possible sources: Sc~eduled report setup by a CORE order; and, real time report requests as forwarded from the report request/Report Manager **Server** 250. The report generation process is hereinafter described with respect to real-time reports from the StarWRS system.

As mentioned, requests are received in real time from the Report Mana er **Server** 250 which either passes on-demand reports ~rom an end-user, or reports that it has internally scheduled via Report scheduler **server**

260. In the TVS **server** 550, a report manager proxy process 250' gathers information about the reports to be generated from the reference database 551 by determining whether the...requiring generation of call detail data ("CDT") reports, i.e., those requiring Call detail records, the destination of the report, e.g., StarWRS Inbox **server** 270, fax, U.S. mail, etc., is determined from the reference database 551. Then, the requested data is gathered based on the metadata request, analyzed...

...be understood that reference data that originates from CADB and COMS may be necessary to complete these reports: Furthermore, although not shown, the TVS 45 **server** is provided with an additional set of queues and CDT processes for each of the CDR processing to allow longer reports to not interfere with...

...55 allowing for report generation to continue when the MCI Mail Internet Gateway is not available.

If the report is destined for the StarWRS Inbox **server** 270 , the data is formatted in a comma separated value (CSV) format and sent to the Inbox via FTP. The 60 Inbox is notified via...

...to formulate a query and runs the report for the scheduled time period.

After TVS runs the report, TVS sends the report to the Inbox **server** component 270 of StarWRS immediately after they are completed.

#### RTM

As further shown in Figure 18, the nMCI Interact's web-based front-end and...via an RTM graphic user interface: and preferably (~,ommunicated over secure TCP/IP socket connections for input over the firewall 25 to at least one **secure server** , e.g., a DMZ RTM Web **Server** 52 (Figure 2) that provides for authentication, validation, and session management in the manner as described herein.

Particularly, the user first establishes communication with the RTM Web **server** 52 (Figure 2), Dispatcher and StarOE systems to enable logon, authentication and verification of Real Time traffic Monitor entitlements, as described above with respect to...

...Unpriced data RTM products for which the customer is provisioned. With more particularity, the user connects to the RTM URL. and checks the RTM Web **Server** 55 implementing an HTTP Post method. In response, the RTM Web **Server** generates a cookie and implements the RTM Web **Server** common gateway interface protocol ("CGI") to send a validation request to TVS via TCP/IP with the cookie. TVS **server** 550 validates the logon

-62- 11052.KLK

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request by referencing Level of Service tables (not shown) provided in the Traffic View **server** that confirm the customer is enabled for RTM, as indicated at step 729. The TVS **server** stores user information with the cookie, and returns the validation information to the Web **Server** . Next, via CGI, an HTML page is sent to the user as indicated at step 731 presenting the user with an RTM screen and menu...

...also delete a user profile. The entered selection criteria may be saved by the subscriber as a new user profile for storage in the TVS **server** Level - of - use tables, as indicated at steps 744 and 745, or submitted directly to the TVS **server** , as indicated at steps 749 and 750. It should be understood that all TVS RTM functionality may be available to the customer. If, at step...

...e., 800/8xx or VNET number to report, polling interval, and define statistics, as indicated at step 748, and submit it directly to the TVS **server** , as indicated at steps 749 and 750 (Figure 23(b)).

At this point, the user can interact with the RTM application to formulate a request...

...and submits the query to the call detail database which is the repository of all call detail records for the particular number selected. The TVS **server** selects the call detail data in accordance with the user 50 profile or selection at step 754, and passes the data to the RTM Web **Server** which formats the data into an HTML table, as indicated at step 756. This HTML table is sent to the user's browser at step...

...Interact RTM polling process. As shown in Figure 24, the RTM system supports an HTML form "Post" or 60 automatic refresh, to an active **server** page script.

-63- 11052.KLK

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Thus, a Web page providing real-time unpriced call detail data ~as a...

...which point the Web browser 20 will re post a request for data (HTTP Post). The Post request is received by an Internet Information (web) **Server** ("IIS") process 590 in the RTM **server** 52 that executes an active **server** page ("\*.asp") script. This asp script calls a DLL JDollinq routine 593 via a communications (COM) interface. This pollin DLL is a Visual C++ application running in the RTM Web **server** 52. Upon receipt of the timeout request, the DLL calls the TVS **server** 550 for real-time call detail data retrieval via TCP/IP messaVin. Particularly, the call detail request is received by a RTM data retrieval process 595 executing in the TVS **server** 550.

Then, the real time data for each phone number (e.g., 800/8xx or VNET) is retrieved from the call detail database 598, which...Service Inquiry Another application of the suite of telecommunications network applications is the 50 networkMCI Interact Service Inquiry ("SI") application which is a web-based **network management** product that enables customers to manage, i.e., create, status, and display service requests ("trouble tickets"), to-the enterprise service provider (MCI). Particularly, 55 through a client application **GUI** , customers have the ability to create and query trouble tickets ("tickets").

Figure 2 illustrates the service inquiry "SI" application **server** 36 interfacing with a backend Customer Service Management" ("CSM") legacy

host ~ystem 40(a). The SI aElication **server** component 36 includes processes for andling all requests made of Service inquiry by the customer (as relayed via the Dispatcher 26).. Specifically, requests are handed...

...with the other elements of the networkMCI Interact architecture. The Common Objects framework is utilized to leverage existing infrastructure services such as logon and authentication, **transaction** management, and security. Particularly, the Service Inquiry application extends the COAppImpl class in orger to inter-o erate with the Interact back plane and...

...applications (as required), and, includes one or more screens derived from the COAppFrame class. Most of the high level classes dealing with the initiation of **transactions** are utilized by Service Inquiry. The COClientSession class is available to the Service Inquiry application upon successful login to the networkMCI Interact ...COBulkTransactions class may be utilized.

Figure 25(a) illustrates the high-level design of the Service Inquiry application 2200 including the client application 2250 and **server** 2300 components.

As shown, Service Inquiry requires integration with a 45 number of external systems and utilizes the Common objects Framework for inter-application communications. Interfacin with the Service Inquiry application **server** 36 via t9e common objects framework are the StarOE **server** ', e.g., for user profile 50 information, as well as other Service Inquiry specific data, and, the CSM legacy host that provides the ability to query, status, and take action on service inquiries. Communication between the SI aWlication **server** 36 and CSM 40(a) is via Registry mi leware, 55 such as described in commonly owned, co-pending U.S.

Patent Application No. 08...

...above-referenced Registry ~ystem has a number of options for inter-application communication, including both Java and CORBA interfaces.

The Service Inquiry communications and application **server** packages provide the framework for transporting client messages to the mid-tier aElication **server** for invocation of domain objects.

T e domain objects encapsulate the logic to translate the actual client messages and deliver the re uest to the backend services. The response from the ~ackend service is then received by the application **server** and returned to the originating client. The framework enables customers to develop the **business** logic independent of the underlying transport layer and negate the need to modify the transport layer whenever a new domain model is introduced into the framework.

The separation of the framework from the domain is accomplished through

the use of reflection by dynamically loading and executing the **business** logic at the application **server** once the client request specification is received.

As described herein, the SI application **server** 2300 interfaces with the Le acy Backend 40(a), CSM/SI through a Requester object ~310 and Receiver object 2350 as shown in Figure 25...

...2310 is the class that represents the requester which takes the request data that comes from the Front-End/Client application through the **Transaction Manager** 2320 builds the CSM/SI request **transactions** by interacting with the Translator classes 2380 and strips off the requests to CSM. The request data that comes from the requester is used to be made. Minimal information is passed from the client to reduce the communication overhead from the client to the SI application **server**. All other information is packaged in the Requester. Particularly, the Requester object 2310 uses the SvcInqRegistryHeader and SvcInqSIHeader classes in the Translator 2380 to build the "I/ Registry Header" and "SI Header" strings that are required for the CSM/SI request **transactions**. It also talks to the SvcInqActivity or the SvcInqRemarks classes to build the data portion of the CSM/SI requests. Once the CSM/SI **Transaction** String is formatted the actual request to CSM is made. Sending the **transaction** to CSM's Standard Interface (SI) via Registry classes 50 does this.

The receiver object is an instance of the SIRegistryHandler class whose responsibility is...

...detail or list of Ticket object 60 from the response string that is received from CSM.

The built object is then sent back to the **Transaction Manager** 2380 who passes it back to the Front End/Client.

Figure 7(a) illustrates a diagram depicting the execution of a **transaction** by the SI application **server** 36 with each bubble representing a separate thread. The following itemized scenario describes the sequence of events in detail with each number in the scenario associated with the numbers in Figure 7(a).

First, at step 501, the SI Application **Server** instantiates and starts the **Transaction Manager** 260 in a separate thread. The SI Application **Server** then.

instantiates and starts the **Transaction Server** 250 in a separate thread at step 502. The SI Application **Server** 36 instantiates and starts the Registry **Server** in a separate thread at step 503.

In operation, the **Transaction Server** receives a client **transaction** request, as shown at step 504. The connection is accepted and **Transaction Handler** thread is removed from the thread pool for execution, as indicated at 505. The **Transaction Handler** unpackages the **transaction** request at step 506 and puts the request message into the **Transaction Manager**'s RequestQ. The **Transaction Manager** 260 removes

the request message from its RequestQ at step 507 and spawns a **Transaction Executer** thread to execute the **transaction**. Then, at step 508, the **Transaction Executer** translates the message and executes the **transaction** by loading the domain class and invoking the specified method which sends the request to the backend services. As indicated at step 509, the backend service responds by sending the result of the **transaction** to the Registry **Server** which accepts the connection. At step 510, a Registry Handler is removed from the thread pool, for execution for performing translation of the received message and placing the result into the **Transaction Manager**'s ResponseQ, as indicated at step 511. The **Transaction Handler** retrieves the **transaction** result from the ResponseQ at step 512 and the **transaction** response is delivered to the client at step 513.

The mainframe legacy, backend 40(a) "Registry" is the cross-platform communication mechanism that is 45...

...messages from the CSM host. It shields applications from network protocols. CSM is provided with a mainframe database (not shown) that provides a set of **Transactions** to request CSM information through its Standard Interface (SI) which uses Registry as the messaging system. The Service Inquiry Application **server** 2900 is configured to communicate asynchronously with CSM using Registry's RQS as the Inter-Process Communication (IPC mechanism. Since 55 CSM supports...

...response to the Receiver.

Registry configuration consists of configuring the Registry client which sends request messages to CSM from the Service Inquiry Requester and Registry **server** that receives responses from CSM and passes it to the Service Inquiry receiver. As shown in Figure (b) the Registry Queuing system, RQS is an asynchronous mode of inter process communication where there is one queue on the client and one on the **server** and there is only one TCP/IP connection always open between the client and the **server**. The client puts its requests on its own local queue 2322 and it is then forwarded to the queue on the **server**. The **server** takes the request off the queue, processes the request and the response messages are put in the client's queue 2325. Since there is only one TCP/IP connection at any given time between the client and the **server** this mode is very efficient in terms of both network and system resources.

As in the other application of the nMCI Interact suite, the Service... 2461e; or, remove all parameters in 50 the table by selecting the "Remove All" button 2461f.

As an example, a "List Tickets by Status Request" **transaction** will provide all the tickets for a given organization (ORG code with the requested status and created after a specified date. The ORG code to-be passed in this **transaction** is one of the selection criteria representing the originating organization or the organization where the ticket was created. The customer may choose from a list...

...then he/she has implied access to all the subordinate organizations meaning that the request will apply to the subordinate organizations as

well. Furthermore, this **transaction** may only display some of the details/fields of the tickets which means that the data cached from this request may only be used to process the Queries on tickets. It cannot be used to view all the details of the tickets for which further CSM/SI **transactions** will have to be made as will be herein described.

Once the query is specified and executed, the "Query Results" window such as provided in...the query results and select "View/Details" from the menu bar or double click the ticket in the query results. Particularly, a "Display Ticket Request **Transaction** " (CSM/SI **transaction** ) may be used to obtain the details, activities and remarks of a ticket. This **transaction** allows several display requests to be made, e.g., by setting corresponding flags to 'Y'. Whenever the customer wishes to view details, remarks or activities...

...all the three flags set and the ticket number stuck into the SI header which will generate three or more responses. The "Display Detail Response **Transaction** " is a response that returns all the data elements corresponding to a given ticket in a "Details" window such as the example window 2490 shown tickets.

Alternately, to find a ticket, e.g., upon selection of the "Find- button 2453 from the tool bar 2450, the CSM/SI **Transaction** , "Display Ticket Request **Transaction** " is invoked, where the ticket number is passed on the request for handling as described above.

It should be understood that, in the preferred embodiment, a "Change Ticket Request **Transaction** " may be implemented allowing the customer to change some of the fields of a ticket that is already created. This restriction is enforced by the **GUI** as this CSM/SI **transaction** does not impose any such conditions on the field being modified.

Remarks are comments added to a ticket for historical purposes and can aid in the resolution of the problem. A customer must be viewing the particular ticket's.details that contain the remarks desired. The "Display Remarks Response **Transaction** " 45 is a response that shows all the comments added, on the ticket either by the customer or by the enterprise (MCI). The CSM legacy...

...display of the "Add Remarks" window (not shown) which allows the customer to add remarks to that Ticket. Thus, by implementing an "Add Remarks Request **Transaction** , " the customer may add remarks on a ticket that is in an open status at any time. This may be used as a final step just after creating a ticket, for example, to enable the customer to describe the trouble in his/her own words or add any comments. This **transaction** returns a success or failure response.

Activities are events that occur to a ticket throughout its lifecycle. These events include changing status, changing priority...

...of the person working the ticket. The customer must be viewing the particular ticket's details that contain the activities desired. The "Display Activity Response **Transaction** " is a response that provides all the activities, i.e., actions that have been taken on the ticket.

Specifically, from the "Details" window 2490 (Figure...

...as shown in & example screen display 9f Figure 25(k). From the activities window, the activities for that ticket are displayed.

. This is a useful **transaction** in checking the status of a ticket and, it aids in tracking a ticket as it shows which organization the ticket is currently in.

The...the Event-Type/Call-Type of the problem which is basically the way CSM handles different problem types and is required for most CSM/SI **transactions** .

To do that the client front end asks the customer the problem/identifier type and then narrow down the problem by having the customer choose...

...is then gathered from 45 the customer by presenting appropriate questions.

once all the required information is available, the system performs an "Open Ticket Request **Transaction** " and passes all of the data fields. The CSM legacy system then attempts to open a Trouble Ticket based on 50 the data passed, and performs an "0 en Ticket Response **Transaction** " to indicate if the ticket was created successfully along with the ticket number. Based on this response a confirmation message along with the...

...out to an organization obtained from the user up.front and stored in the User Profile. This is done using an "Enter Activity Request **Transaction** " which allows the customer to enter different activities like 'Refer Out', 'Close', 'Refer Back' and 'Open' on a ticket by passing the appropriate activity code.

Finally, the SI application allows the customer to close the ticket by using an "Enter Activity Request **Transaction** " described with respect to ticket creation. When a customer wishes to close a ticket, the system will make this **transaction** on behalf of the customer by passing the activity code for 'Close'. A customer is allowed to close a ticket only if it were created...

...satisfied with the problem resolution, that customer may refer the ticket back to the enterprise (MCI). This is also accomplished using the Enter Activity Request **Transaction** . Again, the system will make this **transaction** and pass the activity code for 'Refer Back'.

The creation of trouble tickets through Service Inquiry will now be described in greater detail in view...

...with the client presentation layer and interaction with the back-end systems. Information that is gathered via the presentation layer is used to construct backend **transactions** . The information 60 returned from these backend **transactions** is formatted to DOM classes, which are forwarded to the presentation layer.

As shown in Figure 25(m), the TroubleTicket 2610 is the root of... telecommunications network management applications is the toll free network management tool 60 8 as shown in Figure 26. Referred to herein as BTFNM," the toll free **network management** tool 200 provides the client **GUI** and middle-tier service that enable customers to request, specify, receive and view data pertaining to their toll free **network management** assets, e.g., toll free number routing plans, and to generate orders for changing aspects of the routing plans via a World Wide Web interface...

...directives are preferably communicated as Java applets over secure TCP/IP socket connections for input over the firewall 25a to at least one secure Web **server** 24, e.g., a DMZ Web **server** that provides for authentication, validation, and session management in the manner as described herein. In view of Figure 26, as will be described, the TFNM tool 800 implements a TFNM domain **server** 840 which is one component part of a back-end MCI infrastructure comprising: MCI's NetCap system 240, a Service Control Manager 290a ("SCM" are processed with the features specified in the order. The TFNM **server** 840 interfaces with the "NetCap" 290 mainframe system that provides user interface to the network control system, e.g., DAP switches 290b. The TFNM domain **server** 840 includes Java object classes whose methods are invoked by Java applets running on the customer browser. The browser Java applets specifically execute the customer directives by invoking certain methods on the TFNM Domain **server** 840. These Java objects additionally provide the interface functions to the NetCap 240. In the preferred embodiment, the Java objects at the TFNM domain **server** function as a proxy, and are invoked remotely implementing a Java remote method invocation "RMI"-like methodology.

Particularly, as described herein with respect to 45...

...applications over the Internet, there is provided common objects and an infrastructure allowing secure communications between a client (which resides on a browser) and a **server** (which resides 50 safely within MCI's firewalls). As briefly mentioned, the security strategy includes: encrypting communication from the client to the web- **server** via SSL (HTTPS) and implementing HTTPS as the preferred method for allowing communication into the web **server** 55 from the Internet; providing an additional firewall between the web- **server** and the dispatcher to allow only specific traffic from the web **server** to the dispatcher to occur; encrypting traffic between the web **server** and the dispatcher via DSA encryption; and enabling the dispatcher to validate all packets destined to internal MCI **servers** to ensure that they are from an authenticated client, and that a particular client has permission to communicate with a specific back-end **server**. To make this seamless for the client the aforementioned set of common objects performs this messaging. In the preferred embodiment, the invention implements a modified RMI which is referred to as "CORMI" (Common Objects RMI) which provides an RMI-like interface between the client and the **server** using the networkMCI Interact protocol.

The CORMI procedures implemented have additional controls built in to provide the necessary session security and maintenance for communication

over the firewalls.

More specifically, CORMI is nMCI Interact's protocol for providing secure, client-to-**server** communication with Java RMI-like semantics and comprises a library of Java classes used by both the client nplet and **server** application. In view of Figure 2, the communication path from the client and the **server** is as follows:

The TFNM **server** application 840 registers remote objects with CORMI's CORRemoteSessionServer (analogous to Java RMI's Registry service) and then blocks waiting for connections. The TFNM client **applet** initiates communication by performing a logon through a COClientSession object. The COClientSession creates a COSynchTransaction (an atomic unit of work based over an HTTPS socket) which connects to the MCI Interact system dispatcher **server** 835 (which is behind the outer firewall 25(b)) and interfacing with StarOE **server** 39. The dispatcher **server** 26 validates the client's authorization to logon (a ...generating a session key with a :cookie~arltprocess). After validating the client the dispatcher uses a round robin protocol to select a TFNM **server** and then opens an HTTPS connection to an instance of the TFNM **server** application. On this **server**, the CORRemoteSessionServer creates a new session for this client and records the session key.

A reply to a logon is sent back through the dispatcher...attached to the selected Time interval node equals 100 percent. Action keys 1695a 1695d may additionally be enabled for user selection in accordance with enterprise **business** rules and/or user security. Specifically, key 1695a enables the 45 submission of the QUIK/TEMP QUIK order to NetCap for approval (Issue key...Figure 24(b)). The TFNM tool additionally may provide "drag and drop" enabling users to configure routing elements between plans.

Although the TFNM web/Internet **network management** tool has been described herein with respect to a customer's toll-free, e.g., 1-800/8xx networks, the principles may be readily applied...

...Another application of the suite of telecommunications network applications is the networkMCI Interact Outbound Network Manager application 2700. Referred to herein as "ONM," the outbound **network management** tool 2700 provides the client **GUI** and middle-tier service that enable customers to manage and track Calling Party Number Orders, Calling Card Orders, Dialing Plan orders, and ID Code Set...

...entry system 290, Service Control Manager 290a ("SCM") and Data Access Points 290b ("DAP11). The ONM server 2750 enables customers to change their Vnet/Vision **network management** plans, both in real time and on a scheduled basis, via nMCI Interact's web-based front-end and middle-tier infrastructure.

Particularly, customer order... -

...directives are preferably communicated as Java applets over secure HTTPS

socket connections 2722, 2724 for input over the firewall 25(a) to at least one **secure server**, e.g., a DMZ Web server 24 that provides 45 for authentication, validation, and session management in the manner as herein described. After validation and...a new one, the nMCI Interact ONM system Dialing Plan Order option allows a company to define their call routing Dialing Plans to meet their **business** needs and manage their network costs. Thus, the nMCI Interact Outbound NM Dialing Plan order enables a customer to: 1) Create 7-digit Private Numbers...Wo 99/15979

-106 viewing and retrieval in the manner as described herein.

#### EVENT MONITOR

As mentioned above, another application of the suite of telecommunications **network management** applications is the Broadband reporting system 850.

As shown in the high level process flow diagram of Figure 30 customers are enabled to request, specify...

...Interact system may be implemented to support Broadband report request, report retrieval, and alarm monitoring functions. All interactions with the Broadband reporting and system **network management** platform ("SNMP") features occur between the Broadband client **applet** 852 and a Broadband **server** 860. Particularly, Broadband applications Java classes invoke a "message class" that has the Common Object code as an interface definition.

Integrated within the...over time, and then, to determine whether the network should be changed to ensure that it is operating at maximum performance levels (i.e., meeting **business** needs). The Broadband reporting system thus enables customers to review network performance data over a period of time, e.g. up to 45 days, by...enabling the retrieval of a map viewer application for generating maps portraying the customer's virtual networks.

In the preferred embodiment, a Broadband Main Display **applet** is provided as a launching pad for accessing all of the aforementioned Broadband services. The Main Display **applet** is preferably a **Java applet** running inside the user web browser 20 and utilizing classes which extend the basic Java **applet** functionality in areas such as application management, user session management, user-interface, inter- **applet** communication, and client/ **server** communications.

Particularly, from the Broadband Main Display applet access to and communications between Broadband applications is provided using the Common Object COApplet, COApp...indicated at step 972; and, map reports, as indicated at step 973.

Thus, in the preferred embodiment, the Broadband Report Viewer component includes Java **applet** viewer classes that enable the downloading and display of performance reports generated from the Broadband 50 **server** 860. In the preferred embodiment, there are at least two types of viewer classes providing the following reports: 1) Monthly Network Health

Reports which are...drill down capability: by double clicking on a section of a graph, the supporting data is displayed.

The Broadband Report Viewer component additionally includes Java **applet** classes enabling the display of customer configuration maps which are two dimensional maps having certain locations highlighted, e.g., customer gateways, in addition to...

...further detail. Besides having the ability to generate network performance reports and configuration maps, the Report Viewer component of the Broadband Reporting tool includes Java **applet** classes enabling the presentation of real or near real-time alarm and network event data obtained from the **network management** platform, "NetExpert" 870 as shown as Figure 31. Via a proxy application 871, events and alarm notifications are sent to the BB **server** 860 which processes the alarms for communication through the dispatcher/BBProxyServer applications directly to the BB client 852, via secure TCP/IP socket messaging, as...a click on any identified 45 point provides greater detail about the circuits supported from that end point including: circuit location; Circuit number; Gateway mnemonic; **Network Management** ID; Bandwidth; # PVC; and, CIR Total. As shown in Figure 35(b), lines connecting PVC end points 50 are also drawn by a mouse click...clears an alarm and removes it from the database.

It should be understood that all Network Detected Alarms are event-based and discovered by SNMP **Network Management** tool. User Defined Alarms include "Ad-Hoc Threshold" alarms which are, generated in instances where a customer set value in a custom report is exceeded...

...enabled to: Get SNMP statistics and Set SNMP name.

Particularly, the process flow for providing SNMP Get/Set capabilities begins by invocation of an SNMP **applet** which is sent to the client workstation by the BB **Server** application B~ selecting the SNMP Get/Set button 1732 (Figure 3a(a)) from the main display causes the creation of a SNMPGetSetApp. (COApp) object to manage...SNMP variables from other 50 circuits, or, may end the session. As in the case of Broadband network systems reporting, the nMCI Interact suite of **network management** applications further includes an event monitor tool 1000 for enabling customers to monitor, over the Internet or a 55 company Intranet, their dedicated voice and customers to make informed **network management** decisions.

More specifically, the Event Monitor tool 1000 of the nMCI Interact System gives customers the ability to: exercise alarm management from a single...

...Figure 36, the Event Monitor system 1000 is integrated within the nMCI Interact system comprising: the user web browser 14 which employs an event monitor **GUI** 1030 enabling the generation of requests and receipt of responses from various event monitor system server processes 1050 over the Web/Internet via a secure...server 1050 functioning as a client to receive authentication information including logon user identifiers which

are supplied in response to launch of the event monitor **GUI** applet 1030. The billing identifiers and levels of services, including the specific entitlement information are supplied from StarOE 39 to the event monitor...

...may then view alarms and take necessary steps to correct the problem. The performance parameters and thresholds 50 may be modifiable via the event monitor **GUI** applet 1030 by those customers having proper access level entitlements as verified by the StarOE 39. Each of the components shown in Figure 36 and their respective processes will be described in further detail herein.

#### Event monitor **GUI** client application

All alarms and reports for event monitor are accessible via the "networkMCI Interact" alarming and reporting structure established within the nMCI Interact home page 79. Event monitor alarms are viewed via an alarm monitoring system in which both broadband and event monitor alarms may appear. The event monitor **GUI** client application is launched via the event monitor icon 87 on the home page (Figure (a)). Reports for fault reporting may be requested through the report requeator component of StarWRS, and the inbox server.

In the preferred embodiment, the event monitor **GUI** client application 1030 is launched by selecting the event monitor icon 87 from the "networkMCI Interact" home page (Figure 5(a)). The event monitor **GUI** client application provides a menu bar, toolbar, and ...explain reporting activity in progress; and 6) providing access to custom reporting capability via the toolbar and menu.

In the preferred embodiment, the event monitor **GUI** application is implemented in Java to ensure platform independence and particularly is developed using many of the networkMCI Interact's common objects as described herein. Particularly, the Event monitor 45 **GUI** application, via the COApp object, may create its own display space and present its user interface in a separate frame by having the space in...

...web page, a concurrent (side-by side) access to more than one networkMCI Interact 60 application service is possible.

In another embodiment, the event monitor **GUI** application's startup code may be implemented using the COApplet class.

For determining the user's event monitor service options, the **GUI** client application requests and retrieves user profiles including the user entitlements from an event monitor customer database populated by a periodic feed (e.g., on a daily basis) from StarOE 39 (Figure 36).

From the event monitor **GUI** client application, an alarm management object is also launched upon initialization of the **GUI** client application. The alarm management object essentially creates a blank user interface and starts a thread to handle communications with the event monitor server...or frame slips.exist but service is still available.

A Drill down view depicting each alarm down to the individual circuit is

available via the **GUI** as will be described below.

#### Reporting functionality

As described above, the existing and new event monitor reports may be requested via the report requestor, a for maintaining better control and problem resolution schemes during their **network management** process.

Moreover, the event monitor presents via the report viewer applet, the map of the continental U.S.

(World for global customers/services) for purposes...

...monitor are sent to the customers' inbox for spreadsheet display for on-line reviews. All current alarms are retrieved by the customer's web browser **GUI** applet using polling techniques at session initiation.

Customers may define.a period of time during,which their alarms remain in current status, allowing non current...illustrates an example of a back-end configuration 1002 for the fault management system for reporting telecommunication service conditions. The back-end configuration includes a **network management** system 1004 which collects network events , including alarms and traffic densities from a common carrier network 1006. All of the events collected by **network management** system 1004 are reported.to an event monitor host 1008. The common carrier keeps track of the performance and network faults for network 1006 through a myriad of **network management** systems 1004 and routes the information in real-time to the event monitor host 1008. In order to provide information regarding a particular customer's...near 45 real-time a database of events pertinent to each customer's leased services. The accumulated data is viewable via the client browser application **GUI** and also via the StarWRS reporting system as described above. Because individual customers may subscribe to 50 various different services which may experience different events, event monitor server 650 must not only collect different sets of data on a real-time basis, but the client browser application **GUI** and the reporting system must also present the data in a 55 format relevant to the particular services to which the customer subscribes. This data...

...organized for display to the user in an event queue.

In the preferred embodiment of the present invention, event monitor host 1008 is an Integrated **Network Management** System (INMS) host implemented as an IBM S/370 mainframe and the event monitor server 1050 is implemented as an IBM RS6000 computer; the architecture...

...server 1016 as the database management system (DBMS). In the referred embodiment, database 1010 comprises two Ktabases. The first database includes information relevant to other **network management** applications (for example, MCI Service View@), such as facilities and circuit prefixes, and a customer mapping table for all customers subscribing to the event monitor service.

The second database includes statistics relating to the various

facilities monitored by **network management** system 1004. In the preferred embodiment, these statistics are compiled and updated on a regular 45 basis, by MCI Extended Super Frame Monitoring Units.

...and stores such information as the user's log on password, access security, and the various alarm descriptions and their 55 status as reported by **network management** system 1004.

Database 1010 includes a number of tables of data which are accessed by the client browser application **GUI** to event displays, including alarm displays, alarm report, facilities cross-references and event log displays. In addition to the StarOE authentication and entitlement checking, user...data fields 55 on which the data to be displayed is sorted.

Once the event view has been defined, the client browser application transmits a **transaction** request to the server 1050 via the web/dispatch server. An SQL statement is generated at the server 1050, to create the event view from...

...In a preferred embodiment, the primary sorting criterium is severity. The sorted events are displayed to the user on the client browser application. **GUI** in a step 1034. Each event displayed is accompanied by an acknowledgment field for the user to indicate his acknowledgment of the event queue for display to the user in order of the severity of the event.

#### CALL MANAGER

Another application of the suite of telecommunications **network management** applications is the call manager ("CM") system which provides sophisticated mechanisms, e.g., intelligent call routing, for call center customers to control delivery of toll...manager webstation 10 is typically owned and maintained by the customer. The call manager 50 webstation 1130 includes a web-based graphical user interface ( **GUI** ) application which enables the customers to define their call terminations, and provision routing rules and associated tabular data to control routing by the SCP host 1110. The **GUI** application also presents alarms and near real time graphical displays of peg counts and ACD-based statistics. The application also provides reports and data extracts of historical data, including call detail records (CDRs), ACD-based statistic, and peg 60 counts. In addition, user-id administration functions including **business** hierarchy structures and function profiles may be performed via the call manager webstation's web-based **GUI** application.

In addition, the Nexus client workstation 1126 is included as an alternative client for the SCP host 1110. The presence of the call manager...

...host systems. As shown in Figure 41, the client desktop systems 1130 with Internet connectivity have standard browsers executing Java applets, i.e., a client **GUI** application, downloaded from the call manager web server 1132. The web server 1132 which is located in the above-described

demilitarized zone (DMZ) 17 of...  
...two firewalls: an Internet firewall 25(a) and an enterprise intranet firewall (b). The call manager integrated data server 45 (CMIDS) generally han les the **business** and data logic associated with the call manager functionality. Each of the above components will now be described in detail with reference to additional figures.

As described above, the client webstation 1130 50 provides a web-based graphical user interface ( **GUI** ) offering data management and data presentation features for the call manager system. The web-based front-end **GUI** is typically written using the Java programming language to insure platform independence.

55 The client webstation 1130 typically includes a web browser with Java applets...

...are dnamicall~ downloaded to the client browsers (client we s t ations 1130 when the Uniform Resource Locator (URL) for the call manager webstation client **GUI** application is accessed.

The call manager webstation client **GUI**  
application of the system of the  
Claim

WHAT IS CLAIMED IS:

1. An integrated and secure system for  
conducting **business** over the public Internet by enabling a customer of  
an enterprise communications network to command and control the  
customer's switched communications connections within the...

...support encryption, customer identification, authentication and network  
entitlements; (b) at least one secure web server for managing secure  
customer sessions over the public Internet, said **secure server**  
providing session management for the customer connection, said session  
management including customer identification, validation, entitlements  
and encryption; (c) at least one dispatch server for communicating...

...to command and control the communications network resources provided by  
the enterprise to the customer.

1 2. The integrated and secure system for 2 conducting **business** over  
the public Internet as

3 claimed in Claim 1, wherein said switched 4 communications connections  
further includes switched voice traffic and said network manager may  
command and 6 control said switched voice traffic.

1 3. The integrated and secure system for 2- conducting **business** over  
the public Internet as

3 claimed in Claim 2, wherein said switched voice 4 traffic further  
includes switched toll free voice traffic and said...

...6 network manager application to command and control the 7 routing of said switched voice traffic.

1 4. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 2, wherein said switched voice 4 traffic further includes switched call center voice traffic and...

...6 manager application to command and control the routing of said switched voice traffic between call centers.

5. The integrated and secure system for conducting **business** over-the public Internet as

claimed in Claim 2, wherein said network manager includes an outbound network manager to command and control said switched toll traffic.

6. The integrated and secure system for conducting **business** over the public Internet as

claimed in Claim 1, wherein said switched communications connections further includes switched voice and data communications and said network manager may command and control said switched voice communications.

7. The integrated and secure system for conducting **business** over the public Internet as

claimed in Claim 1, ...view application includes a reporter for generating reports on the switched voice communications in said network traffic.

8. The integrated and secure system for conducting **business** over the public Internet as

claimed in Claim 7, wherein said reporter for generating reports on the switched voice communications in said network traffic includes a real time reporter for generating reports on said network traffic in near real time.

9. The integrated and secure system for conducting **business** over the public Internet as

claimed in Claim 7, wherein said reporter for generating reports on the switched voice communications in said network traffic includes a real time reporter for generating reports on outbound network traffic in near real time.

10. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 7, wherein said reporter for 4 generating reports on the switched voice communications in said network...

...for generating history reports on said 7 switched voice communications occurring during 8 preselected periods of time.

11. The integrated and secure system for conducting **business** over the public Internet as

claimed in Claim 7, wherein said reporter for generating reports on the switched voice communications in said network traffic includes...

...applications and an in-box manager 9 application for communicating the reports to the customer.

1 12. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 7, wherein said reporter for 4 generating reports on the switched voice communications in said network traffic includes a 6 priced call application for enabling a customer to 7 generate priced reports and **invoices** for a plurality 8 of switched voice communication applications.

1 13. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 1, wherein said customer's switched 4 communications connections includes switched data traffic and said view...

...a broadband view 7 application for generating reports on data relating to 8 the switched data traffic.

14. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 6, wherein said system includes an 4 in-box application for storing and forwarding reports to the customer on data relating to the customer's 6 switched voice and data traffic.

1 15. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 1, wherein said system includes an 4 event monitor application for storing and forwarding alarms generated with respect to the customer's 6 traffic over the communications network.

16. The integrated and secure system for conducting **business** over the public Internet by 3 enabling a customer of an enterprise communications 4 network ...identification, authentication and report 14 entitlements; (b) at least one secure web server for 16 managing secure customer sessions over the public 17 Internet, said **secure server** providing session 18 management for the customer connection, said session 19 management including customer.identificatipn, validation, report entitlements and encryption; 21 (c) at least one...

...plurality of system resources from a single point of customer contact,

identification and 41 authentication.

1 17. The integrated and secure system for z conducting **business** over the public Internet as

3 claimed in Claim 16, wherein said report requestor 4 provides a single tool set for requesting and scheduling reports across a plurality of system 6 resources.

1 18. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 16, wherein said reports are 4 historical reports on the customer's switched voice traffic.

1 19. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 16, wherein said reports are priced 4 call reports on the customer's switched communications connections.

1 20. The integrated and secure system for z conducting **business** over the public Internet as

3 claimed in Claim 19, wherein said reports are **invoices** 4 generated with respect to the customer's switched communications connections.

1 21. The integrated and secure system for z conducting **business** over the public Internet as

3 claimed in Claim 20, wherein said system further 4 includes an electronic fund transfer application to enable payment of the **invoices** generated with respect 6 to the customer's switched communications connections.

1 22. The integrated and secure system for 2 conducting **business** over the public Internet by 3 ...identification, authentication and report 14 entitlements; (b) at least one secure web server for 16 managing secure customer sessions over the public 17 Internet, said **secure server** providing session 18 management for the customer connection, said session 19 management including customer identification, validation, report entitlements and encryption; 21 (c) at least one...

...system 32 resources provided by the enterprise to the customer, 33 said event monitor application providing said customer 34 with data necessary to make informed **network management** decisions with respect to said plurality of 36 system resources from a single point of customer 37 contact, identification and authentication.

1 23. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 22, wherein said event monitor 4 includes a report manager for requesting and scheduling reports on events occurring within

the 6 customers switched communication connections.

1 24. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 22, wherein said event monitor 4 includes a report manager for requesting and scheduling reports on events occurring within the 6 customers switched data communication connections.

1 25. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 22 wherein said event monitor 4 provides customer access to a plurality of reports on trouble tickets opened on events occurring, within the 6 customers switched communication connections.

1 26. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 22, wherein said system further 4 includes a toll free network manager as one of said...

...and said manager 6 provides reports on the customers switched toll free 7 voice connections.

1 27. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 22, wherein said system further 4 includes a call center manager as one of said pluralityThe integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 22, wherein said system further 4 includes an out bound network manager as one of said...

...and said outbound 6 network manager providing reports on the customers 7 outbound network calls.

1 29. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 28, wherein said system further 4 includes a single order entry application and an out bound...

...outbound network 13 calls in response to entitlements determined by said 14 order entry application.

1 30. The integrated and secure system for 2 conducting **business** over the public Internet by 3 enabling a customer of an enterprise communications 4 network to modify the customer's **business** relationship with the enterprise over the public Internet and to 6 add, delete and modify services provided by the 7 enterprise communications network to the...

...identification, authentication and network entitlements; 16 (b) at least

one secure web server for 17 managing secure customer sessions over the public 18 Internet, said **secure server** providing session 19 management for the customer connection, said session management including customer identification, 21 validation, entitlements and encryption; 22 (c) at least one-dispatch...

...to manage the 38 communications network services provided by the 39 enterprise to the customer.

1 31. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 30, wherein said system further 4 comprises an E-Billing application which enables electronic **business transactions** to pay for said 6 services, said order entry and E-Billing applications ...customer to manage and pay for 9 the communications network services provided by the enterprise.

1 32. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 31, wherein said system further 4 includes a client view application for generating historical reports of data relating to calls by 6 customers users on said communications network.

1 33. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 32, wherein said system enables 4 **invoice** generation and electronic payment for pre selected customer user calls over the public Internet.

1 34. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 30, wherein said system further 4 includes a toll free network manager as one of said...

...9 toll free call routing entitlements from a, single point of customer identification and authentication.

1 35. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 30, wherein said system further 4 includes a call center manager application as one of said...

...to modify said call 9 center routing entitlements from a single point of customer identification and authentication.

36. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 30, wherein said system further 4 includes an event monitor application as one of said plurality of resources.

1 37. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 36, wherein said system further 4 includes a broadband view application for reporting on data communications...

...monitor application reports alarm events occurring 7 with respect said customers data communications 8 connections.

1 38. The integrated and secure system for z conducting **business** over the public Internet as

3 claimed in Claim 36, wherein said system further 4 includes a service inquiry application for managing trouble tickets generated...

...order 7 entry application allows modification of user 8 entitlements with respect to said trouble tickets.

1 39. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 30, wherein said system further 4 includes a real time monitor application as one of said plurality of resources.

1 40. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 31, wherein said system further ...said E-Billing application enables electronic fund 8 transfers for payment of said calls by said customer.

41. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 40, wherein said system further 4 includes a priced reporting application for generating **invoices** for said calls.

1 42. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 30, wherein said plurality of system 4 resources includes a network manager which enables command and...

...and control the 11 communications network resources provided by the 12 enterprise to the customer.

1 43. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 42, wherein said customer's traffic 4 further includes switched voice traffic and said network manager may command and control said switched 6 voice traffic.

1 44. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 43, wherein said switched voice 4 traffic further includes switched toll free voice traffic and said...

...network manager application to command and control the 7 routing of said switched voice traffic.

1 45. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 43, wherein said switched voice 4 traffic further includes switched call center voice traffic and said...

...to command and control the routing 7 of said switched voice traffic between call centers.

1 46. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 43, wherein said switched voice 4 traffic further includes switched toll voice traffic and said network...

...includes an outbound network 6 manager to command and control said switched toll 7 traffic.

1 47. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 42, wherein said customer's traffic 4 further includes switched data communications and said viewing application may view data representative of 6 said switched data communications.

1 48. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 42, wherein said customer's traffic -191 4 further includes switched voice traffic anpl said viewing...

...includes a reporter for generating 6 reports on the switched voice communications in said 7 network traffic.

49. The integrated and secure system for conducting **business** over-the public Internet ...time reporter for 6 generating. reports on said network traffic in near 7 real time.

1 50. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 48, wherein said reporter for 4 generating reports on the switched voice traffic in said network...

...for 6 generating history reports on said switched voice 7 traffic

occurring during preselected periods of time.

51. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 48, wherein said reporter for 4 generating reports on the switched voice communications in said network...

...applications and an in-box manager application 9 for communicating the reports to the customer.

1 52. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 48, wherein said reporter for 4 generating reports on the switched voice traffic in said network traffic includes a priced call 6 application for enabling a customer to generate priced 7 reports and **invoices** for a plurality of switched voice 8 traffic applications.

1 53. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 47, wherein said viewing application 4 to view said switched data communications includes a broadband view application for generating reports on 6 data relating to the switched data communications.

1 54. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 47, wherein said system further 4 includes an in-box application for storing and forwarding reports to the customer on data relating to 6 the customer's switched data communications.

55. The integrated and secure system for conducting **business** over the public Internet as

3 claimed in Claim 47, wherein said viewing application electronic **business transactions** to pay for, said 6 services, said order entry and E-Billing applications 7 responsive to proxy requests from said dispatch 8 server to enable...

...customer to manage and pay for 9 the communications network services provided by the enterprise.

1 59. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 56, wherein said system further 4 includes a client view application for generating historical reports of data relating to calls by 6 customers users on said communications network.

1 60. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 56, wherein said system enables 4 **invoice** generation and electronic payment for pre selected customer user calls over the public Internet.

1 61. The integrated and secure method for 2 conducting **business** over the ...customer request to modify a 36 routing plan to a proxy request for said toll free 37 network manager and providing near real time electronic **business transactions** to pay for said 6 services, said order entry and E-Billing applications 7 responsive to proxy requests from said dispatch 8 server to enable...

...customer to manage and pay for 9 the communications network services provided by the enterprise.

1 59. The integrated and secure system for 2 conducting **business** over the public Internet as

3 claimed in Claim 56, wherein said system further 4 includes a client view application for generating historical reports of data relating to calls by 6 customers users on said communications network.

1 60. The integrated and secure system for 21 conducting **business** over the public Internet as

3 claimed in Claim 56, wherein said system enables 4 **invoice** generation and electronic payment for pre selected customer user calls over the public Internet.

1 61. The integrated and secure method for 2 conducting **business** over the public Internet by 3 enabling a customer of an enterprise communications 4 network to command and control the customer's switched communications connections...communications network resources provided by the enterprise to the customer 41 in near real time.

1 62. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 61, wherein said method further 4 includes entering customer orders through a single order entry point...

...and to modify said entitlements 9 from said single point of customer identification and authentication.

1 63. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 62, wherein said method further 4 includes enabling payment with an E-Billing application, said order...

...to manage and 8 pay for the communications network services provided 9 by the enterprise.

1 64. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 61, wherein said method further 4 includes the step of generating historical reports of data relating to calls by customers users on said 6 communications network with a client view application.

1 65. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 61, wherein said method includes the 4 step of generating electronic **invoices** and electronically transmitting funds to pay for pre 6 selected customer user calls.

1 66. The integrated and secure method for 2 conducting **business** over the public Internet which 3 enables a customer of an enterprise communications 4 network to modify the customer's **business** relationship with the enterprise over the public Internet and to 6 add, delete and modify services provided by the 7 enterprise communications network to the...

...identification, authentication and network entitlements; 16 (b) managing secure customer sessions over 17 the public Internet with at least one secure web 18 server, said **secure server** providing session 19 management for the customer connection, said session management including customer identification, 21 validation, entitlements and encryption; 22 (c) communicating with said secure...

...and to modify said entitlements from a single point of customer 36 identification and authentication.

1 67. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method further 4 comprises the step of enabling electronic payment for said plurality...

...to 9 electronically manage and pay for the communications network services provided by the enterprise.

1 68. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method further 4 includes the step of generating historical reports of data relating to calls by customers users on said 6 communications network with a client view application.

1 69. The integrated and secure system for z conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method further 4 includes the steps of generating **invoices** and enabling electronic payment for pre-selected customer user 6 calls over the public Internet.

1 70. The integrated and secure method for

.z conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method further 4 includes the step of providing a toll free network manager...

...toll free 7 routing entitlements from said single point of 8 customer identification and authentication.

1 71. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed ...modify said call center routing entitlements from said 11 single point of customer identification and 12 authentication.

72. The integrated and secure method for conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method further 4 includes the step of providing an event monitor application as one of said plurality of system 6 resources.

1 73. The integrated and secure method for conducting **business** over the public Internet as

3 claimed in Claim 72, wherein said method further 4 includes the step of reporting on data communications connections with a broadband view application.

1 74. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method further 4 includes the step of managing trouble tickets generated with respect...

...9 respect to said trouble tickets from said single point of customer identification and authentication.

1 75. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method further 4 includes the step of monitoring communications traffic utilized by the...

...a real time monitor 6 application as one of said plurality of system 7 resources.

1 76. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method further 4 includes the step of generating historical reports of data relating to calls by customers users on said 6 communications network with a client view application.

1 77. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 76, wherein said method further 4 includes the step of generating **invoices** for said calls with a priced reporting application and enabling 6 electronic fund transfers with for payment of said 7 calls with an E-Billing application.

1 78. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 66, wherein said method includes the 4 steps of providing a plurality of applications for the...

...traffic over the enterprise communications network, 7 and viewing said communications traffic with a 8 reporting application.

79. The integrated and secure method for conducting **business** over the public Internet as

3 claimed in Claim 78, wherein said customer's 4 communications traffic further includes switched voice traffic and a network manager application is provided 6 for said command and control step.

1 80. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 79, wherein said switched voice 4 traffic further includes switched toll free voice traffic and...

...free 6 network manager application to command and control the 7 routing of said switched voice traffic.

81. The integrated and secure method for conducting **business** over the public Internet as

3 claimed in Claim 79, wherein said switched voice 4 traffic further includes switched call center voice traffic and said...

...to command and control the routing 7 of said switched voice traffic between call centers.

1 82. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 79, wherein said switched voice 4 traffic further includes switched toll voice traffic and said network...

...includes an outbound network 6 manager to command and control said switched toll 7 traffic.

1 83. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 78, wherein said customer's 4 communications traffic further includes switched data communications and said method includes the step of 6 viewing data representative of said switched data 7

communications.

1 84. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 78, wherein said customer's 4 communications traffic further includes switched voice traffic and said method...

...includes generating 6 reports on the switched voice traffic with a report 7 generator application.

1 85. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 84, wherein said step of generating 4 reports on the switched voice traffic in said network...

...real time reporter for generating 6 reports on said network traffic in near real time.

1 86. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 84, wherein said step of generating 4 reports on the switched voice traffic in said network...

...for generating history 6 reports on said switched voice traffic occurring 7 during preselected periods of time.

87. The integrated and secure method for conducting **business** over the public Internet as

3 claimed in Claim 84, wherein said step of generating 4 reports on the switched voice communications in said network...

...report with an in-box manager 9 application which communicates the reports to the customer.

1 88. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 84, wherein said step of generating 4 reports on the switched voice traffic in said network traffic includes a priced call application for 6 enabling a customer to generate priced reports and 7 **invoices** for a plurality of switched voice traffic 8 applications.

1 89. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 83, wherein said step of viewing said 4 switched data communications is conducted with a broadband view application which generates reports on 6 data relating to the switched data communications.

1 90. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 89, wherein said method further 4 includes storing and forwarding reports to the customer on data relating to the customer's switched 6 data communications with an in-box application.

1 91. The integrated and secure method for 2 conducting **business** over the public Internet as

3 claimed in Claim 90, wherein said viewing step 4 includes storing and forwarding reports on alarm reports generated with respect to the customer's 6 switched data communications with an event monitor 7 application.

92. An intel4rated and secure system for conducting **business** over the public Intern6t by enabling a reseller of an enterprise communications services to brand those services as those of the reseller over the public

...

...party customer identification, authentication and entitlements; (b) at least one secure web server for managing secure third party customer sessions over the public Internet, said **secure server** providing session management for the third party customer connection, said session management including third party customer identification, validation, entitlements and encryption; (c) at least one...

...to enabling the reseller of communication services to represent said plurality of system resources as its own.

93. The integrated and secure system for conducting **business** over the public Internet as

claimed in Claim 16, wherein said reports are generated in real time with respect to the customer's switched communications connections by a real time monitor application.

94. The integrated and secure system for conducting **business** over the public Internet as

claimed in Claim 16, wherein said switched communications includes voice traffic, and said reports are generated in real time with respect to the customer's switched communications connections by a real time monitor application.

95. The integrated and secure system for conducting **business** over the public Internet as

claimed in Claim 30, wherein said single point of customer contact provides a click and connect dial up connection to...

5/3,K/13 (Item 13 from file: 349)

DIALOG(R) File 349:PCT Fulltext

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**INTEGRATED PROXY INTERFACE FOR WEB BASED BROADBAND TELECOMMUNICATIONS MANAGEMENT**  
**INTERFACE MANDATAIRE INTEGREE POUR LA GESTION DE TELECOMMUNICATIONS A LARGE BANDE SUR LE WEB**

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Detailed Description

Claims

Detailed Description

... BASED BROADBAND TELECOMMUNICATIONS MANAGEMENT

The present invention relates generally to information delivery systems and, particularly, to a novel, World Wide Web(Web)/Internet-based, telecommunications **network** data **management** reporting and presentation service for customers of telecommunications service entities.

Telecommunications service entities, e.g., MCI, AT&T, Sprint, and the like, presently provide for the presentation and dissemination of customer account and **network** data **management** information to their customers predominantly by enabling customers (clients) to directly dial-up, e.g., via a modem, to the entity's application servers to...

...as AT&T, Sprint, LCI, etc., provide management and performance

information relating to circuits comprising a customer's Broadband network, e.g., frame-relay. Such **network management** information generally includes details of network use and performance such as, for instance, real time status and alarm information, near real time performance data, usage...the performance of their telecommunications virtual data, i.e., "Broadband" networks. Particularly, the novel Web-based (Internet and Intranet) client-server application is a telecommunications **network management** tool that provides customers with a visual representation of their physical and logical networks across all of their domestic sites, e.g., frame relay, and...

...networks, enabling them to determine if their network needs to be changed to ensure that it's operating at maximum performance levels to meet their **business** needs. Additionally, customers are enabled to monitor, via their Web browser interface and in real-time, network alarms and real-time events affecting their network.

Particularly, the Broadband **network**

**management** tool supports three technologies: Frame 45 Relay, Switched Multi-megabit Data Service (SMDS), and may also support Asynchronous Transfer Mode (ATM).

The reporting tool utilizes...

...a Performance Reporting System ("PRS") which provides 50 the means for obtaining network performance data specific to a customer's broadband network; and, a Simple **Network Management** Protocol ("SNMP") system which is an alarm monitoring system providing real time or near-real time alarm status conditions of customer network components to customer...

...for enabling interactive Web based communications with the reporting system, the client workstation identified with a customer and providing the integrated interface; at least one **secure server** for managing client sessions over the Internet, the **secure server** supporting a first secure socket connection enabling encrypted communication between the browser application client and the **secure server**; a dispatch server means for communicating with the **secure server** through a firewall over a second socket connection, the first secure and second sockets forming a secure communications link, the dispatch server enabling forwarding of...50 software architecture of the networkMCI Interact system; Figure 3 is an illustrative example of a backplane architecture schematic; Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 5 is a diagram depicting the physical networkMCI Interact system architecture; Figure 6 is...

...between the application specific proxy back to the Dispatcher server (Figure 15(b)).

The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system ("nMCI Interact") such an integrated suite of Web-based applications provides system, having one or more **downloadable application** objects directed to front end **business logic**, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer requested...

...in a manner such that multiple programs are combined in a unified application suite. A second or middle tier 12, is provided having secure web **servers** and back end services to provide applications that establish user sessions, govern user authentication and their entitlements, and communicate with adaptor programs to simplify the...

...customer workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain 45 abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are 50 designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or Call Manager functions.

The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview the front end **business logic** and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as:

1...

...3) inter-application communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 3 is a diagrammatic example...

...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 80 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor 72; an alarm monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also...

...and a Message Center 77 for providing enhancements and functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to start, stop, and...Figure 2, it is understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 40(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and (d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted...

...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response.

Specifically, a proxy will accept a request...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 30 and Legacy Mainframe Systems 40 which comprise the back end **business** logic applications.

As illustrated in Figure 5, the present invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between two...reports, such as provided by MCI's StarODS Server 33 in a variety of user selected formats.

All reporting is provided through a Report Requestor **GUI** application interface which support spreadsheet, a variety of graph and chart type, or both simultaneously. For example, the spreadsheet presentation allows for sorting by any...

...the inbox when a report is selected.

A common database may be maintained to hold the common configuration data which can be used by the **GUI** applications and by the mid-range servers. Such common data will include but not be limited to:

customer security profiles, billing hierarchies for each customer... actual identified sender. one technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** .

Another component of the nMCI Interact infrastructure includes order entry, which is supported by the Order Entry ("StarOEff) server. The general categories of features to...

...view Report Requestor Server 222 and Broadband view Inbox Server 224 components. All interactions with the Broadband reporting and SNMP features occur between a Broadband **applet** 221 and the Broadband **server** 250 via the Dispatcher 26 and Broadband proxy application 204.

Particularly, Broadband application's Java classes invoke a "message class" that has the Common Object...server 250 include: 1) a Performance Reporting System ("PRS") server 280 for sending performance and statistical data to the Broadband server; and, 2) a system **network management** platform 290 ("SNMP") which is a tool that feeds real or near real-time SNMP alarm and network event data to the Broadband Web server ...Web Server 250 functioning as a client to receive authentication information and Bill ID and Level of service information which are supplied in response to **launch** of the Broadband **applet** .

50 With further regard to the Broadband order entry process, a first step is setting up the appropriate Broadband circuits/PVCs which is done by... time, and 50 then to determine whether the network should be changed to ensure that it is operating at maximum performance levels (i.e., meeting **business** needs). The Broadband reporting system further enables customers to review network performance data over a period of -19 time, e.g., up to 45 days...in the URL into the Web Browser where a connection is made to the networkMCI Interact web page, as indicated at step 402. A logon **applet** is sent to the web page at step 403. Having accessed the web page, the user logs in, as indicated at step 405, and a user Common Object is created. At this point, a message is sent via an established TCP/IP connection via a Dispatcher **Server** 26 (Figure 6) to the StarOE **Server** '260 to validate the customer as indicated at step 407. Once the customer is validated, at step 408a,b, the backplane objects request a list of all the authorized applications from the StarOE **server** , as indicated at step 410. At steps 412 and 414 respectively, a networkMCI Interact **applet** is downloaded to the customers Web Browser via the established TCP/IP connection, and the browser presents the customer with the networkMCI Interact systems home...

...been verified by StarOE, the backplane object allows the user access to the Broadband Client front end. As shown at step 416, a client Broadband **applet** is downloaded to the customer who is presented with the Broadband screen, as indicated at step 418.

45 An exemplary Broadband web-page BB Main...enabling the retrieval of a map viewer application for generating maps portraying the customer's virtual networks.

In the preferred embodiment, a Broadband Main Display **applet** is provided as a launching pad for accessing all of the aforementioned Broadband services. The Main Display **applet** is launched by selecting Broadband Services from an nMCI Interact home page (Figure 9). Preferably, the Main Display is a Java **applet** running inside the user web browser 220 and utilizing classes which extend the basic Java **applet** functionality in areas such as application management, user session management, user-interface, inter- **applet** communication, and client/ **server** communications. Particularly, from the Broadband-Main Display **applet** access to and communications between Broadband applications is provided using the Common Object COApplet, COApp, and COBackPlane services. In the manner as shown in Figure 3, the Main Display **applet** BBMainDisplay inherits from COAppIMPL class with a COApplet interface and is launched from the nMCI Interact COBackPlane using the COApplet interface. When a user clicks...

...the corresponding application. When the user exits from Broadband services, the COBackPlane is utilized to destroy the application and its windows.

The Broadband Main Display **applet** provides a menu-bar, toolbar, and status bar for accessing Broadband services according to the customer's subscribed service option which includes: Basic; Standard; Enhanced SNMP; Premium; Enhanced Adhoc Reporting; Enhanced SNMP + Adhoc Reporting; and Dedicated SNMP. As determined by the user logon session with the StarOE **server** 260, if the user is not entitled or does not have authorization for a particular service, the corresponding toolbar icon or menu item is disabled...submits the custom report request it is forwarded to the Broadband Inbox for subsequent view.

When basic service option is provided, the Broadband main display **applet** has the responsibility of: 1) requesting service type (entitlements) either from StarOE authentication **server** or as data from BackPlane (Figure 3); 2) requesting reports that are no longer on the Inbox **server** to be retrieved from a report data archive if a pre-determined period of time 45 has elapsed, e.g., 45 days, and provide these...as indicated at step 432; and, map reports, as indicated at step 433.

Thus, in the preferred embodiment, the Broadband Report Viewer component includes Java **applet** viewer classes that enable the downloading and display 45 of performance reports generated from the Broadband web **server** 250. In the preferred embodiment, there are at least two types of viewer classes providing the following reports: 1) Monthly Network Health Reports which are...

...in addition to a fourth reporting Exceptions view. Besides having the ability to select reports on a daily or monthly basis, a custom reporting Java **applet** is provided to enable customers to select Broadband "ad hoc" (one time) reports at any previously defined interval. For example, a customer may have a...

...drill down capability: by double clicking on a section of a graph, the supporting data is displayed.

The Broadband Report Viewer component additionally includes Java **applet** classes enabling ...further detail. Besides having the ability to generate network performance reports and configuration maps, the Report Viewer component of the Broadband Reporting tool includes Java **applet** classes enabling the presentation of real or near real- time alarm and network event data obtained from the **network management** platform, "NetExpert" 290 as shown as Figure 6. Via a proxy application 291, events and alarm notifications are sent to the BB **server** 250 which processes the alarms for communication through the dispatcher/BBProxyServer 45 applications directly to the BB client 221, via secure TCP/IP socket messaging...

...enter the reporting period information, as indicated at step 456. The user is prevented from making invalid requests by edit checks in entry fields and **business** rules embedded in program logic. At step 457, the request with criteria is sent to the BroadBand View Server 250 where it is converted into...Thus, a click on any identified point provides greater detail about the circuits supported from that end point including: circuit location; Circuit number; Gateway mnemonic; **Network Management** ID; Bandwidth; PVC; and, CIR Total. As shown in Figure 13(b), lines connecting PVC end points are also drawn by a mouse click on... 10(b)). As shown in Figure 10(d), after the user selects SNMP Alarm button function from the main display at step 501, an SNMP **applet** is sent 50 to the user by the BB **Server** application at step 503 to enable an SNMP client at step 503a. Particularly, the Main Display creates a SNMPAlarmPanelApp object to manage the application and...an alarm and removes it from the database.

It should be understood that all Network Detected Alarms are event-based and discovered by SNMP 50 **Network Management** tool. User Defined Alarms include "Ad-Hoc Threshold" alarms which are generated in instances where a customer set value in a custom report is exceeded...SNMP Get/Set capabilities after user logon and authentication process is performed (Figure 10(b)). As shown in Figure 10(e), at startup, an SNMP **applet** is sent to the client workstation by the BB **Server** application at step 551. At step 553, selection of the SNMP Get/Set button (Figure 12(a)) from the main display causes the creation of...at step 578, the user may submit new requests to set SNMP variables from other circuits, or, may end the session.

As mentioned, the Broadband **network management** tool 200 is an objected oriented application implemented in a client server architecture. To implement the Broadband reporting functionality as described herein, the Broadband proxy...side stub method, if required.

In particular, the Broadband Server proxy 26 is a process with multiple interfaces to the Broadband Web server database and **GUI** , each interface providing method signatures for a series of discreet services via specific Java methods. These interface/method combinations include: 1) BBAlarmServerInterface which provides SNMP...end database updates, keyed by values.

Java Database Connectivity (JDBC), e.g., such as the jConnect® system by Sybase, can be used as the 50 **transaction** protocol between the Broadband proxy and the Broadband Server. Object returning methods return either 1) a single object made up of string values as documented...

...the Secure Web Server(s) 24 to access the underlying message; a DMZ Web header 614 which is used to generate a cookie 611 and **transaction** type identifier 616 for managing the client/server session; a dispatcher header 615 which includes the target proxy identifier 620 associated with the particular type of **transaction** requested; proxy specific data 625 including the application specific message utilized by the target proxy to form the particular messages for the particular middle tier... indicates the message type/mechanism 130 which may be one of four values indicating one of the following four message mechanisms and types: 1) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request, e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...

...indicates the status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction** . More complete error data will be included in the specific error message returned. The status field 140 is included to maintain consistency between requests and...

...get the request serviced. The application proxy supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages. Particularly, in performing the verification, translation and communication functions, the proxies employ front end proxy C++ objects and components.

outgoing (server-to-client) communications...

#### Claim

... Web 7 based communications with said reporting system, said 8 client workstation identified with a customer and 9 providing said integrated interface; at least one **secure server** for managing 11 client sessions over the Internet and supporting a 12 secure socket connection enabling encrypted 13 communication between said browser application client 14 and said **secure server** , said **secure server** enabling forwarding of a request message from said client 16 browser application and forwarding of an associated 17 response message back to said client browser...

5/3,K/14 (Item 14 from file: 349)

DIALOG(R) File 349:PCT Fulltext

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00632799 \*\*Image available\*\*

INTEGRATED PROXY INTERFACE FOR WEB BASED TELECOMMUNICATIONS NETWORK MANAGEMENT  
INTERFACE MANDATAIRE- INTEGREE DE GESTION DE RESEAUX DE TELECOMMUNICATIONS  
BASEE SUR LE WEB

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**INTEGRATED PROXY INTERFACE FOR WEB BASED TELECOMMUNICATIONS NETWORK MANAGEMENT**

Fulltext Availability:

Detailed Description

Claims

English Abstract

A Web/Internet-based Outbound **Network Management** tool (200) that enables customers (100) of telecommunications network providers to modify outbound access to their virtual networks via a Web/Internet- based graphical user...

Detailed Description

**INTEGRATED 2ROXY INTERFACE FOR**

**WEB BASED TELECOMMUNICATIONS NETWORK MANAGEMENT**

The present invention relates generally to information delivery systems and, particularly, to a novel, WWW/Internet-based, telecommunications **network management** service for customers of a telecommunications service provider.

Telecommunications service entities, e.g., MCI, AT&T, Sprint, and the like, presently provide for the presentation and dissemination of customer account and **network data management** information to their 1.~ customers predominantly by enabling customers (clients) to directly dial-up, e.g., via a modem, to the entity's application servers...

...calls to U.S. and international locations. This allows for a consolidation of all company long distance usage charges for all locations under one corporate **invoice** and one basic rate structure subject to a volume discount.

Another MCI MSV product is referred to as "Vision" which is an integrated product for consolidated or multi-location **business** . The "Vision" network platform is similar to that of "Vner-," and is also a software defined virtual network telecommunications service offering a single solution...

...Toll-Free service, card, data and the different access types which include: outbound, Toll-free inbound, switched data, dedicated and IntraLATA.

Vision also offers Customized **Business** Programs with special rates and discounts geared to meet customer's specific traffic pattern needs.

Further provided by MCI is an MSV Outbound **Network Management** system ("Outbound NM") which enables customers to manage the Vnet/Vision Features selected for their networks including: 1) Call Tracking and Control Features; 2) Call Routing Features; and 3) SUBSTITUTE SHEET (RULE 26) Multiple Networks Feature. Particularly, the MSV Outbound NM system is a PC-Windows based **GUI** to MCI's Network Control System ("NCS") which comprises interrelated software and hardware components allowing customer's to enter and process MCI Outbound NM orders...

...extending a customer's Vnet/Vision network beyond a corporate boundary; 4) establishment of Supplemental Codes which may be used for controlling and monitoring a **business** including IID codes that specify who may place calls and their range privileges, and accounting codes that associate a call with a category that...ability too review orders without changing SUBSTITUTE SHEET (RULE 26) them; and, the ability to see the status of an order.

While the current Outbound **Network Management** features in the current MSV platform are sufficient for those with existing access, a need exists to provide a newer, faster platform with new Outbound **network management** capabilities for customers through the public Internet.

Moreover, a need exists to integrate the existing MSV Outbound **network management** client-server application in a Web-based platform which provides expedient comprehensive and more secure data access and reporting services to customers from any Web browser on any computer workstation anywhere in the world.

The present invention is directed to a novel Outbound **network management** too! for a Web-based (Internet and Intranet) client-server application that enables customers to define their own Virtual Network (Vnet) routing plans via the...

...implements a Remote Method Invocation 'IRMI'l-like protocol providing customers with the ability to request, specify, receive and view data pertaining to their Vnet **network management** assets,

e.g., Vnet number routing plans, calling card

-Inventories, etc., and to generate orders for changing aspects of the

Vnet routing plans via a...software architecture of the networkMCI Interact system; Figure 3 is an illustrative example of a backplane architecture schematic; 1~ Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 5 is a diagram depicting the physical networkMCI Interact system architecture; Figure 6 is...

...a suite of nMCI Interact applications; Figures 9(a)-9(p) illustrate various examples of ONM web page screen dialogs enabling user interaction with Outbound **Network management** system.

The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system P'nMCI Interact") such an integrated suite of Web-based applications...

...customer work station 1-0 and provides customer access to the enterprise svscem, having one or more downloadable application objects directed to front end **business**

-)5 logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer...workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1-) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or Call Manager functions. The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview...

...generally are integrated using a "backplane" services layer 12 which provides a set of services to the 1:, application objects which provide the front end **business** logic and manages their launch. The networkMCI interact common set of objects provide a set of services to each of the applications such as: 1) session management; 2) application **launch** ; 3) inter **application** communications; 11) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 3 is a diagrammatic example...interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

1-~ Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 80 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor 72; an alarm monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also...

...and a Message Center 77 for providing enhancements and functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a single object, COBackPlane which keeps track of all the client applications, and which has capabilities to

start, stop, and...Figure 2, it is understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. in the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 40(a). Such **network management** and customer network data is additionally accessible by SUBSTITUTE SHEET (RULE 26) authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and 40(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only and it is understood other legacy platforms may be integrated...

...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

#### SUBSTITUTE SHEET (RULE 26)

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request...prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 30 and Legacy Mainframe Systems 40 which comprise the back 3 5 end **business** logic applications.

#### SUBSTITUTE SHEET (RULE 26)

As illustrated in Figure 5, the present invention includes a double or complex firewall system that creates a "demilitarized...reports, such as provided by MCI's StarODS Server 33 in a variety of user selected formats.

All reporting is provided through a Report Requestor **GUI** application interface which support spreadsheet, a variety of graph and chart type, or both simultaneously. For example, the spreadsheet presentation allows for sorting by any...

...the inbox when a reDort is selected.

A common database may be maintained --o hold the common configuration data which can be used by the **GUI** applications and by the mid-range servers. Such common data will include but not be limited to:

customer security profiles, billing hierarchies for each customer...

...actual identified sender. One technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** .

Another component of the nMCI Interact infrastructure includes order entrv, which is su-o-oorted

-)5 bv the ...invention focuses on the client, middle-tier and proxy service that enable cuszomers to

-request, specify, and receive and view data pertaining

--o their Vnet **network management** assets, e.g., Vnet number routing plans, calling card inventories, etc., and to generate orders for changing aspects of the Vnet routing plans via a World Wide Web interface.

As shown in Figure 6, the Outbound **Network Management** "ONM" tool 200 of the invention implements an ONM domain server 250 which is one component part of a back-end MCI intranet and legacy...

...As will be described in greater detail, the ONM tool 200 of the SUBSTITUTE SHEET (RULE 26) invention enables customers to change their Vnet/Vision **network management** plans, both in real-time and on a scheduled basis, via nMCI Interact's web-based front end and middle-tier infrastructure. Particularly, customer directives...

...directives are preferably communicated as Java applets over secure HTTPS socket connections 222, 224 for input over the firewall 25(b) to at least one **secure server** , e.g., a DMZ Web server 24 that provides for authentication, validation, and session management. After validation and authentication, the DMZ Web server 24, in...a list of all the authorized applications from the StarOE server, as indicated at step 310. At steps 312 and 314 respectively, a networkMCI Interact **applet** is downloaded to the customers Web\_Browser via the established TCP/IP connection, and the browser presents the customer with the networkMCI 7nteract systems home ...a new one, the nMCI interact ONM system Dialing Plan Order option

allows a company to define their call routing Dialing Plans to meet their **business** needs and manage their network costs. Thus, the nMCI Interact outbound NM Dialing Plan order enables a customer to: 1) Create 7-digit Private Numbers...has been submitted to the ONM server via the send message 222, the ONM server receives the order information for the particular Vnet/Vision outbound **network management** feature, and verifies the user's security with NetCap.

Once the user's security has been verified, the ONM server submits the request to NetCap...

#### Claim

##### WHAT IS CLAIMED IS:

1 1. A Web/Internet based telecommunications 2 **network management** system for managing customer's outbound telecommunications network assets via a client 4 browser application resident at a client workstation, said system comprising:

6 at 'Least one **secure server** for managing 7 secure client sessions over the Internet, said secure 8 server supporting a first secure socket connection 9 enabling encrypted communication between said browser application client and said **secure server** ; 11 a dispatch server for communicating with said 12 **secure server** through a firewall over a second socket connection, said first and second socket connections 14 forming a secure communications link; network configuration device for maintaining...

...receiving 19 customer directives communicated over said secure

-)0 communications link, said directives including a request to access inventory pertaining to that customer's outbound **network management** assets, and 23) downloading details of said outbound **network management** 24 assets to customers over said secure communications link for visual Dresentation at said client 26 workstation.

1 2. The interactive Web/Internet based **network management** system as claimed in Claim 1, further including means for modifying said outbound **network management** assets via said client browser and up SUBSTITUTE SHEET (RULE 26) loading outbound **network management** asset modification 6 directives to said outbound network manager over said 7 secure communications link, wherein said outbound 8 network manager translates said received modification...

...into commands for input to said network configuration device and forwarding said commands to 11 said network configuration device.

3. The interactive Web/Internet based **network management** system as claimed in Claim 2, wherein a customer's outbound telecommunications network asset capable of being modified includes customer's calling oartv numbers.

4. The interactive Web/Internet based **network management** system as

claimed in Claim 2, wherein a customer's outbound telecommunications network asset 4 capable of being modified includes customer's calling card numbers.

5. The interactive Web/Internet based **network management** system as claimed in Claim 2, wherein a customer's outbound telecommunications network asset 4 capable of being modified includes dialing plan details.

6. The interactive Web/Internet based **network 2 management** system as claimed in Claim 2, wherein a customer's outbound telecommunications network asset 4 capable of being modified includes one or more customer ID Codes associated with a customer having 6 corresponding pre-specified user range privileges.

SUBSTITUTE SHEET (RULE 26)

1 7. The interactive Web/Internet based **network 2 management** system as claimed in Claim 1, wherein said outbound **network management** assets pertain to a 4 customer's virtual network.

8. The interactive Web/Internet based nezwork ? management system as claimed in Claim 8, wherein said...

**5/3,K/15 (Item 15 from file: 349)**

DIALOG(R) File 349:PCT Fulltext  
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00632798 \*\*Image available\*\*

**INTEGRATED PROXY INTERFACE FOR WEB BASED REPORT REQUESTER TOOL SET  
INTERFACE MANDATAIRE INTEGREE POUR ENSEMBLE D'OUTILS DEMANDEURS DE RAPPORTS  
BASEE SUR LE WEB**

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Filing Language: English  
Fulltext Word Count: 29002

Fulltext Availability:

Detailed Description  
Claims

English Abstract

A Web/Internet based reporting system provides a common **GUI** enabling the requesting, customizing, scheduling and viewing of various types of reports generated by different server applications (400, 500) and/or application platforms. The reporting...

Detailed Description

... telecommunications service entities.

major telecommunications service entities, e.g., MCI, AT&T, and Sprint, presently provide for the presentation and dissemination of customer account and **network management** information to their customers predominantly through a Windows-based graphical user Interface resident on their computer workstation.

Typically, service entity customers are enabled to directly...

...T-1, etc., to the entity's application and database servers, and initiate the generation of reports of their requested account information through the reporting **GUI** . The report requests initiated by the customer are processed by the entity's application server, which retrieves the requested customer information from one or more databases, processes and formats the information for downloading to the client's reporting **GUI** . It is the case that the telecommunications service providers provide many different services, and many of the associated service applications have been developed independently over...

...operate on many different operating platforms. For instance, MCI's Service View platform ("MSV") provides for the SUBSTITUTE SHEET (RULE 26) generation of Toll-free **Network Management** data, priced call detail or "Perspective" data for usage analysis and trending, and unpriced call detail or real-time "TrafficView" data each of which requires...

...basis, and requires extensive client-side processing to utilize the data. This cuts down on computing resources as the customer requires a dedicated application and **GUI** to process this type of data.

moreover, such reporting systems typically do not provide any report customization or presentation options for the customer, and any...

...periodic or ad hoc "one-shot" reports.

It would be highly desirable to provide an Intranet/Internet/Web-based

reporting system that provides a common **GUI** enabling both report requesting, customizing and viewing of various types of data from different server applications.

Furthermore, it would be desirable to provide an Intranet invention is directed to a novel Intranet/Internet/Web-based reporting system that provides a common **GUI** enabling the requesting, customizing, scheduling and viewing of various types of reports generated by different server applications and/or application platforms. More specifically, the present

...

...the software architecture of the networkMCI Interact system; Figure 3 is an illustrative example of a backplane architecture schematic; Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page; Figure 5 is a diagram depicting the physical networkMCI Interact system architecture; Figure 6 is threaded proxy process.

The present invention is one component of an integrated suite of customer **network management** and report applications using a Web browser paradigm.

Known as the networkMCI Interact system ("nMCI Interact") such an integrated suite of Web-based applications provides...

...on a customer work station 10 and provides customer access to the enterprise system, having one or more downloadable application objects directed to front end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects for the presentation of customer options and customer requested...

...customer workstation includes client software capable of providing a platform independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, toll free **network management** or Call Manager functions. The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a diagrammatic overview...

...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects which provide the front end **business** logic and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as: 1) session management; 2) application, **launch** ; 3) inter **application** communications; 4) window navigation

among applications; 5) log management; and 6) version management.

The primary common object services include:

graphical user interface ( **GUI** ); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

Figure 3 is a diagrammatic example...

...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes.

Figure 4 illustrates an example client **GUI** presented to the client/customer as a browser web page 80 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor 72; an alarm monitor 73; a Network Manager 74 and Intelligent Routing 75. Access to network functionality is also...  
...and a Message Center 77 for providing enhancements and functionality to traditional e-mail communications.

As shown in Figures 3 and 4, the browser resident **GUI** of the present invention implements a SUBSTITUTE SHEET (RULE 26) single object, COBackPlane which keeps track of all the client applications, and which has capabilities...Figure 2, it is understood that each Intranet server of suite 30 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry server 36 includes communication with MCI's Customer Service Management legacy platform 40(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in Figure 2, other legacy platforms 40(b), 40(c) and 40(d) may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 40(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted...Interact middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly. Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request...

...Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet Midrange Servers 30 and Legacy Mainframe Systems 40 which comprise the back end **business** logic applications.

As illustrated in Figure 5, the present

invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between two...reports, such as provided by MCI's StarODS Server 33 in a variety of user selected formats.

All reporting is provided through a Report viewer **GUI** application interface which support spreadsheet, a variety of graph and chart type, or both simultaneously. For example, the spreadsheet SUBSTITUTE SHEET (RULE 26) presentation allows...actual identified sender. One technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each transaction .

Another component of the nMCI Interact infrastructure includes order entry, which is supported by the Order Entry ("StarOE") server. The general categories of features to Reporting System 200, as shown in Figure 6, comprises the following components and messaging interfaces:

1) those components associated with the Client **GUI** front end including a report requestor client application 212, a report viewer client application 215 and, an Inbox client application 210 which implement the logical...

...metadata used for displaying reports. In the preferred embodiment, the RM server 250 employs a Unix daemon that passively listens for connect requests from the **GUI** client applications and other back-end servers and deploys the TCP/IP protocol to receive and route requests and their responses. Particularly, Unix stream sockets...

...translated into a "metadatall format and validated by a parser object built into a report manager proxy 2501 that services requests that arrive from the **GUI** front-end. If the errors are found in the metadata input, the RM 250 will return an error message to the requesting client. If the ...that the RM 250 server can manage reporting data for customer presentation from other back-end and legacy servers including, e.g., Broadband, Toll Free **Network Management** , and Event Monitor servers, etc. in order to present to a customer these types of **network management** and reporting data.

The report manager server additionally utilizes a database 258, such as provided by Informix, to provide accounting of metadata and user report...e., Pick Lists) from StarOE server 285.

A common database may be maintained to hold the common configuration data which can be used by the **GUI** applications and by the mid-range servers. Such common data will include but not be limited to:

customer security profiles, billing hierarchies for each customer...

...cards, etc.. An MCI Internet StarOE server will manage the data base for the common configuration of data.

With regard to the front-end client **GUI**

components, the above-mentioned Inbox client application 210 functions as an interface between the client software and the Inbox server 270 for presenting to the...a new connection when a new message is detected. In this way, multiple messages may be downloaded simultaneously.

The Report Requestor application 212 is a **GUI Applet** enabling user interaction for managing reports and particularly includes processes supporting: the creation, deletion, and editing of the user's reports; the retrieval and display...

...herein, the report scheduler service maintains a list of requested reports for a given user, and forwards actual report requests to the appropriate middle-tier **servers** at the appropriate time.

Additional functionality is provided to enable SUBSTITUTE SHEET (RULE 26) customers to manage their inventory, e.g., reschedule, change, or cancel  
...

...are downloaded to the the customer's workstation in the form of a cab file after initial login.

The Report Viewer application 215 is a **GUI Applet** enabling a user to analyze and display the data and reports supplied from the fulfilling **servers** such as StarODS 400, Traffic View (11TVS") 500, and other systems such as Broadband and toll free network manager. Particularly, the Report Manager 250 includes...time of display, and what further customization options the user has while viewing the report. It additionally includes a common report view by executing a **GUI applet** that is used for the display and graphing of report data and particularly, is provided with spreadsheet management functionality that defines what operations can be...

...messages telling it to display an image or text that may be passed by one of the applications in lieu of report data (e.g., **Invoice** , Broadband report, etc.) All reporting is provided through the Report Viewer interface which supports text displays, a spreadsheet, a variety of graphic and chart types...TCP port. The StarOE server acts as a proxy when messages are sent from the Dispatcher SUBSTITUTE SHEET (RULE 26) server 26 and supports synchronous **transactions** . All data and security information is accessed by direct queries to a StarOE server database 283, such as provided by **Informix**. Once a user is...

...e., services, for the user and which determines which buttons on the home page are active, thus controlling their access to products. This information is **downloaded** by a **GUI applet** that is executed via the Backplane (not shown) and incorporated into the home page that is presented to the user as indicated at steps 612...editing an existing report. From this screen and related report building dialog boxes, all of the initial values for retrieving the MetaData, customization options and **GUI** builder options from the report manager server 250 necessary to build (edit) a report are provided in accordance with the user's entitlements. Thus, in...field 304 presents the user with the following selectable access types: dial 1, card, dedicated, 800 Remote Access, Direct Dial fax, store/forward fax, 800 **Business** line (highlighted in

the Figure 9(f)), 800 wide area telecommunications service, 800 dedicated, 800 Network Call Redirect, local, cellular.

Referring back to exemplar screen...and, 3) a WRSReportManagerUtilParser to format the data returned. In response, the Report Manager creates a Dispatcher object, which contains the SUBSTITUTE SHEET (RULE 26) **business** logic for handling metadata messages at the back-end and utilizes the services of a RMParse class.

Upon determining that the client has sent a...The parser returns a hash table containing the User Report List. At the RM server, the Report Manager creates an Dispatcher object that contains the **business** logic for handling metadata messages at the back-end and utilizes the services of the RMParse class. Upon determining that the client has sent a...

...extracted from the node and used to construct the screen related to the node. The Report Manager server creates the MCIDDispatcher object which contains the **business** logic for handling metadata messages at the back-end and utilizes the services of the RMParse class. Upon determining that the client has sent a...the DMZ StarWeb Server(s) 24 to access the underlying message; a DMZ Web header 346 which is used to generate a cookie 341 and **transaction** type identifier 343 for managing the client/server session; a dispatcher header 345 which includes the target proxy identifier 350 associated with the particular type of **transaction** requested; proxy specific data 355 including the application specific metadata utilized by the target proxy to form the particular messages for the particular middle tier...mechanism 130 which SUBSTITUTE SHEET (RULE 26) may be one of four values indicating one of the following four message mechanisms and types:

1) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request, e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...

...indicates the status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction** . More complete error data will be included in the specific error message returned. The status field 140 is included to maintain consistency between requests and...get the request serviced. The application proxy supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

Particularly, in performing the verification, translation and communication functions, the Report Manager server, the Report Scheduler server and Inbox server proxies each employ front...

...contains the data to store.

After a message is received, the parser object is created in the RMDDispatcher.c object which is file containing the **business** logic for handling metadata messages at the back-end. It uses the services of an 30- RMParse class. Upon determining that the client has sent...input

processed data from the meta data descriptions as indicated at step 980, and send back the proxy header to the Dispatcher based on the **transaction** type, as SUBSTITUTE SHEET (RULE 26) indicated at step 983. A determination is made at step 985 as to whether an error occurs when sending...

...995. Otherwise, as indicated at step 990, the proxy data obtained from the proxy application is sent to the dispatcher in accordance with the specified **transaction** mechanism. A determination is made at step 992 as to whether an error occurs when sending the proxy data back to the Dispatcher server. If...T-i NRL Request -TChar (3) Yes TYPE= Designates Char (30) Yes e.g. Broadband, report type, call priced, real-time, detail type, or exception, **invoice** , news type MIR, CCID, priced call detail, outage ENTPID= Enterprise ID Char (8) Yes Enterprise ID USERID= User's ID Char (20) Yes User1D STDRPTID...

...is server In ARD. Limit using the on request ID is StarWRS 2147483647.

Report  
Requeste  
PRIORITY= Standardized Char (1) ONLY 1 = fatal, 2 major, 3 **Network** news = minor, 4 **Management** info(default), 5 no Priority Levels alert  
COMPRESS Designates Char (1) Yes 0 = data not whether the data compressed, 1 has been data compressed compressed...  
...F = News detail, or news I I TYPE= Designates - Char (30) Yes e.g. Broadband, report type, ca : 11 priced, unpriced, detail type, or exception, **invoice** , news type MIR, CCID, priced call detail, outage USERID= Designates Char (20) Yes Starbucks username intended as assigned in recipient or StarOE audience RPTID= User...

#### Claim

... Web based 7 communications with said reporting system, said client 8 workstation identified with a customer and providing 9 said integrated interface; at least one **secure server** for managing 11 client sessions over the Internet, said **secure server** 12 supporting a secure socket connection enabling 13 encrypted communication between said client browser 14 application and said **secure server** ; report requestor object presenting one or 16 more selectable reporting options for said customer in 17 accordance with pre-determined customer entitlements, 18 said requestor object generating a report request 19 message in response to user selection of a specific reporting option for communication to a **secure server** 21 over said secure socket connection; 22 report manager server for maintaining an 23 inventory of reports associated with a customer and 24 receiving said...

...from said enterprise fulfilling server.

1 3. The reporting system as claimed in Claim 2 2, wherein said report requestor object includes a 3 requestor **applet** downloaded from said web **server** to 4- said client workstation, said **applet** capable of presenting said reporting options for said user on said 6 client workstation in accordance with a report metadata 7 message input.

4. The...an enterprise fulfilling server.

1 23. The method as claimed in Claim 21, 2 wherein said step of generating a report request 3 message includes **downloading an applet** from said first 4 **server** device to said client workstation, said **applet** being executed to present said reporting options for 6 said user at said client workstation.

1 24. The method as claimed in Claim 22, 2...

**5/3,K/16 (Item 16 from file: 349)**

DIALOG (R) File 349:PCT Fulltext  
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00632783

**INTEGRATED CUSTOMER INTERFACE FOR WEB-BASED DATA MANAGEMENT**  
**INTERFACE CLIENTS INTEGREE POUR LA GESTION DE DONNEES BASEE SUR LE WEB**

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Detailed Description  
Claims

English Abstract

...trouble ticket tool enabling a customer to open and monitor trouble tickets relating to products and services provided by an enterprise; 5) a Web-based **invoice** reporting system allowing the customers access to their billing and **invoice** reports associated with the products and/or services provided to a customer; 6) an Internet "online" order entry and administration service to enable customers to...

Detailed Description

... MSV") platform comprising a number of independent legacy systems SUBSTITUTE SHEET (RULE 26) enabling dial-up connectivity for those customers desiring to obtain the following **network management** service and reporting data pertaining to their telecommunications networks: priced call detail data and reporting; toll-free network manager "800NM" call routing data; outbound **network management** data; trouble ticket information; fault manager alarms. Limited interactive toll free network control is additionally supported whereby customers may change the configuration of their toll...

...for providing reports on the performance of customers' Broadband (data) networks.

More particularly, MCI's ServiceView platform ("MSV") provides for the generation of Toll-free **Network Management** data, priced call detail ("Perspective") data for usage analysis and trending, each of which requires a different reporting mechanism due to the nature of the...

...or SUBSTITUTE SHEET (RULE 26) services provided by an enterprise. This comprehensive system should not be limited in its application to enterprises which provide telecommunications **network management** services, but should be generally applicable in enterprises offering various products and services, such as manufacturing industries, utilities companies, and/or enterprises providing courier services... measure of platform independence for the customer.

Furthermore, it would be desirable to provide an Intranet/Internet/Web-based reporting system that provides a common **GUI** enabling both report requesting, customizing, scheduling and viewing of various types of data from different back-end services and applications.

It would also be highly...

...trouble ticket tool enabling a customer to open and monitor trouble tickets relating to products and services provided by an enterprise; 5) a Web-based **invoice** reporting system allowing the customers access to their billing and **invoice** reports associated with services provided to

a customer; 6) an Internet "online" order entry and administration service to enable ...m) illustrates domain object model (DOM) 2600 implemented in Trouble Ticketing; -10 SUBSTITUTE SHEET (RULE 26) Figure 17 illustrates an architectural schematic of the online **invoicing** system 1300 component of system of the present invention; Figure 18 is a flow diagram illustrating an online **invoicing** process flow; Figure 19(a) is a sample criteria screen launched from the home page of the system of the present invention; Figure 19(b) is a sample screen displaying a list of **invoice** reports; Figure 20 is a sample screen displaying an **invoice** document generated by the online **invoicing** system component of the invention; Figure 21 is a flow diagram illustrating an online **invoicing** back-end server process flow 1400 during document indexing and storing; Figure 22 is a flow diagram illustrating an online **invoicing** back-end server process flow when responding to client requests for document presentation; Figure 23 is a schematic illustration of the message format passed from...

...present invention's process flow during logon, entitlement request/response, heartbeat transmissions and logoff procedures; and Figure 25 is a data flow diagram for various **transactions** communicated in the system of the present invention.

Figure 26 is a diagram depicting the physical network architecture of the system of the present invention...

...report applications using a Web browser paradigm. Such an integrated suite of Web-based applications provides an invaluable tool for enabling customers to manage their **business** data assets, quickly and securely, from anywhere in the world.

The architecture for the system of the present invention is organized as a set of...

...resident on a customer workstation 10 and provides customer access to the enterprise system, having one or more downloadable application objects directed to front-end **business** logic, one or more backplane service objects for managing sessions, one or more presentation services objects ...customer workstation includes client software capable of providing a platform-independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the applet classes...

...functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and 2) product specific, for example, online **invoice** viewing SUBSTITUTE SHEET (RULE 26) functions. The system is capable of delivering to customers the functionality appropriate to their product mix.

Figure 2 is a...

...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects that

provide the front-end **business** logic. The backplane services layer 12 also manages the **launching** of the **application** objects. The common set of objects provide a set of services to each of the applications. The set of services include: 1) session management; 2) application **launch** ; 3) inter- **application** communications; 4) window navigation among applications; 5) log management; and 6) version **SUBSTITUTE SHEET** (RULE 26) management.

As shown in Figure 2, the aforesaid objects...s data management information. For example, the Services inquiry server 36 includes communication with the enterprise's Customer Service Management legacy platform 40(a).

Such **network management** and customer network data is additionally accessible by authorized management personnel. As shown in Figure 2, other legacy platforms, e.g. 40(d), may also communicate individually with the Intranet servers for servicing specific **transactions** initiated at the client browser.

The illustrated legacy platforms 40(a), (d) are illustrative only and it is understood other legacy platforms may ...The middle tier software includes a communications component offering three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the application server 40 quickly.

Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in application server 40 response. Specifically, a proxy will accept a request...object's public interface may be used directly.

COApp is the base interface for the applications. The applications, e.g., Trouble Ticketing 54a or Online **Invoice** 54b, generally have their startup code and inter-application interface in a class which implements COApp. Generally, two classes are available for the applications, COAppImpl...including classes for initiating a session, have been already downloaded, for example, from a previous session, the steps 62, 64, 66 are skipped.

The logon **applet** checks for the name/password entry and instantiates a session object in step 72, communicating the name/password pair. The session object sends a message containing the name/password to a remote **server** for user validation in step 74. When the user is properly authenticated by the **server** in step 76, another Web page having backplane object is downloaded in steps 78, 80, 84. This page is referred to as a home page...**SUBSTITUTE SHEET** (RULE 26) Then a user typically requests logoff via menu, close box, etc. When such a request is received the backplane sends Logoff **transaction** to the Web Server. The backplane closes toolbar and directs the Web browser to logon URL. Then the backplane exits.

As further shown in Figure...the system of the present invention, customers no longer have to place manual calls to order entry hubs when requesting order SUBSTITUTE SHEET (RULE 26) **transactions** . For example, users may be added to the system without an enterprise's support team intervention. In sum, customers may manage their communications services in...

...running in a user platform having a Web browser, hereinafter referred to as a OE client application. The OE server 39 processes a number of **transaction** requests relating to authentication and entitlements, from other application services, both from the client and the application server 30 sides of the network. In addition, the OE server 39 receives **transaction** requests from the OE client application 154. The **transactions** are typically message driven and comprise requesting **transactions** and response **transactions** . The OE server 39 responds to the message requests by formulating **transaction** responses and transmitting them to the ...client application

The OE client application 154 is one of the client browser applications running in the Web browser 14, and provides a Web-based **GUI** interface implemented accordingly and conforming to the **GUI** interface standard for the integrated suite of customer data SUBSTITUTE SHEET (RULE 26) management and report applications, as described herein. As described, the OE client application 154 is launched at the client initiation by the backplane object and generally includes Java applications and applets for providing a common Web-based **GUI** for interacting with customers at the front-end side.

When a customer launches the OE application from the home page, the main window as illustrated...

...that user. The main window 1500 having the menu options 1506 and the toolbar 1504 is then presented. The OE client application then sends a **transaction** message "get OE security" including the user id, enterprise id, and the OE application code in the message. The OE server 39 returns racf id...

...user is an external admin, a member of an account team, an internal admin, or a customer support admin, for example. If the user that **launches** the OE **application** is an external admin, the user list is displayed immediately since external administrators may view only one enterprise. For external administrators, an enterprise name is retrieved from the OE **server** 39 by sending and receiving a "get user enterprise list" **transaction** request and response.

If the user is not an external administrator, then a dialog is presented for the user to select which enterprise to view. When user selects an enterprise to view, a "get user list" **transaction** message having enterprise id is sent to the OE server 39 to retrieve a list of user ids, a list of applications for each user, an access type for each application, and reporting types for WRS. The client application also sends a "get application list" **transaction** message to retrieve from the OE server 39 a list of application codes, description, and an application array position. The user list is then displayed...OE client application

154 executed at the customer workstation 20.

Referring to Figure 7, a process running in a OE client application process 154 sends **transaction** request messages via the infrastructure, comprising, e.g., the Web server cluster 24 and a dispatch server 26 (Figure 2), to the OE server 39. The OE server 39 responds to requests by searching the security profile for the information requested, formulating appropriate **transaction** response messages and transmitting them back to the requesting process. As an example, during the login procedure, the client login process formulates a **transaction** message including a user name/password and a validation request for a given customer. The OE server 39 looks for the matching name/password pair...

...for a given customer is stored in customer profile database 160 located with the OE server. When the backplane requests via TCP/IP the entitlement **transaction**, for example, in a "get application list" request message, the security module retrieves and transmits back via TCP/ IP to the backplane the list of authorized applications accessible by a given customer in a **transaction** response. The backplane uses the list to determine which buttons on the home page should be activated, thus controlling access to products. Similarly, individual back **Invoice**

In addition, as mentioned, when a customer first logs on, the customer is presented with a dialog box prompting for user ID and password. When... will now be described in detail, the WRS reporting system 200 comprises the following components and messaging interfaces:

1) those components associated with the Client **GUI** application front end including a report requestor client application 212, a report viewer client application 215 and, an **Inbox** client application 210 which implement the...

...metadata used for displaying reports. In the preferred embodiment, the RM server 250 employs a Unix daemon that passively listens for connect requests from the **GUI** client applications and other back-end servers and deploys the TCP/IP protocol to receive and route requests and their responses. Particularly, Unix stream sockets...

...into a 'metadatall' format and validated by a parser object built into a report manager proxy 250' that services requests that arrive from the **GUI** front-end. If the errors are found in the metadata input, the RM 250 will return an error message to the requesting client. If the...be understood that the RM 250 server may manage reporting data for customer presentation from other back-end and legacy servers including, e.g., Online **Invoice** server, etc., in order to present to a customer these types of data management and reporting data.

The report manager server additionally utilizes a database...Report Requestor client application it needs to get information (e.g., Pick Lists) from the OE server 39.

With regard to the front-end client **GUI**

components, the above-mentioned Inbox client application 210 functions as an interface between the client software and the Inbox server 270 for presenting to the...is provided to enable customers to manage their inventory, e.g., reschedule, change, or cancel (delete) report requests.

The Report Viewer application 215 is a **GUI Applet** enabling a user to analyze and display the data and reports supplied from the fulfilling **servers** such as ODS 400, or real-time data **server** 500, and other systems. Particularly, all reporting is provided through the Report Viewer client application 215 which supports text displays, a spreadsheet, a variety of...

...time of display, and what further customization options the user has while viewing the report. It additionally includes a common report view by executing a **GUI applet** that is used for the display and graphing of report data and particularly, is provided with spreadsheet management functionality that defines what operations can be...

...messages telling it to display an image or text that may be passed by one of the applications in lieu of report data (e.g., **Invoice**, etc.) By associating each set of report data which is downloaded via the Inbox server 270 with a "metadata" report description object, reports can be... enabled to select customization options as indicated at step 330, Figure 11(a). All of the initial values for retrieving the metadata, customization options and **GUI** builder options from the report manager server 250 necessary to build (edit) a report are provided in accordance with the user's entitlements.

The user...to maintain secure connectivity throughout the system, the inbox proxy 270, uses the application program interfaces (APIs), supporting different types of data transport mechanisms: synchronous **transaction** ; asynchronous **transaction** ; and, synchronous bulk transfer. The transport mechanisms are implemented as sockets message protocol, and the proxy handles its conversation processing on a thread or process... system.

A common database such as provided by OE server 39 is maintained to hold the common configuration data which can be used by the **GUI** applications and by the mid-range servers. Such common data will include but not be limited to: customer security profiles, and billing hierarchies for each ...

...data translations, data grouping, data routing, and data logging functions.

According to a dimension table based on data within selected BDRs, the harvesting process applies **business** rules to the data, cleanses the data, transforms the data, creates load files for DataMarts and compresses files for storage in the DataMarts. The harvesting...component 475 that performs the following functions: 1) receives data access requests from various users in the form of a report request from the WRS **GUI** Report Requestor component; 2) routes the query to the appropriate data marts 470, data warehouse or operational data store; and, 3) responds to the requestor with the result set. The DSS server 475 may

also perform cost estimation, agent scheduling, workflow broadcasting interface, and **transaction** logging functions. In the preferred embodiment, the DSS 475 is a cluster of DEC (Digital Equipment Corp.) UNIX 8400 servers running Information Advantage software accessing... product that enables customers to create, status, and display service requests, i.e., trouble tickets, to the enterprise service provider. Particularly, through a client application **GUI** , customers have the ability to create and query trouble tickets ("tickets").

Figure 2 illustrates the Trouble Ticketing application server 36 interfacing with a back-end...architecture provided in the system of the present invention. The Common objects framework is utilized to leverage existing infrastructure services such as logon and authentication, **transaction** management, and security.

Particularly, the Trouble Ticketing application extends the COAppImpl class in order to inter-operate with the backplane and other applications (as required...).

...SUBSTITUTE SHEET (RULE 26) includes one or more screens derived from the COAppFrame class. Most of the high level classes dealing with the initiation of **transactions** are utilized by Trouble Ticketing. The COClientSession class is available to the Trouble Ticketing application upon successful login to the system of the present invention the **business** logic independent of the underlying transport layer and negate the need to modify the transport layer whenever a new domain model is introduced into the framework.

The separation of the framework from the domain is accomplished through the use of reflection by dynamically loading and executing the **business** logic at the application server once the client request specification is received.

The Trouble Ticketing application Server 2300 interfaces with the Legacy Backend 40(a)...

...SvcInqCSMRequester object 2310 is the class that represents the requester which takes the request data that comes from the Front End/Client application through the **Transaction** Manager 2320, builds the CSM request **transactions** by interacting with the Translator classes 2380 and ships off the requests to CSM. The request data that comes from the Front End/Client is...

...SvcInqRegistryHeader and SvcInqSIHeader classes in the Translator 2380 to build the "Registry Header" and "Trouble Ticketing Header" strings that are required for the CSM request **transactions** . It also talks to the SvcInqActivity or the SvcInqRemarks classes to build the data portion of the CSM requests. Once the CSM **Transaction** String is formatted the actual request to CSM is made. Sending the **transaction** to CSM's Standard Interface (SI) via Registry classes does this.

The receiver object is an instance of the SIRegistryHandler class whose responsibility is to...

...activity, detail or list of Ticket object from the response string that is received from CSM.

The built object is then sent back to the **Transaction** Manager 2380 who passes it back to the Front End/Client.

The mainframe legacy backend 40(a) "Registry" is the cross-platform communication mechanism that...

...messages from the CSM host. It shields applications from network protocols. CSM is provided with a mainframe database (not shown) that provides a set of **Transactions** to request CSM information through SUBSTITUTE SHEET (RULE 26) its Standard Interface (SI) which uses Registry as the messaging system. The Trouble Ticketing Application Server...button 2461e; or, remove all parameters in the table by selecting the "Remove All" button 2461f.

As an example, a "List Tickets by Status Request" **transaction** will provide all the tickets for a given organization (ORG) code with the requested status and created after a specified date. The ORG code to be passed in this **transaction** is one of the selection criteria ...26) he/she has implied access to all the subordinate organizations meaning that the request will apply to the subordinate organizations as well. Furthermore, this **transaction** may only display some of the details/fields of the tickets which means that the data cached from this request may only be used to process the Queries on tickets. It cannot be used to view all the details of the tickets for which further CSM **transactions** will have to be made as will be herein described.

once the query is specified and executed, the "Query Results" window such as provided in...the query results and select "View/Details" from the menu bar or double click the ticket in the query results. Particularly, a "Display Ticket Request **Transaction** " (CSM **transaction** ) may be used to obtain the details, activities and remarks of a ticket. This **transaction** allows several display requests to be made, e.g., by setting corresponding flags to 'Y'. Whenever the customer wishes to view details, remarks or activities...

...the three flags set and the ticket number stuck into the Trouble Ticketing header which will generate three or more responses. The "Display Detail Response **Transaction** " is a response that returns all SUBSTITUTE SHEET (RULE 26) the data elements corresponding to a given ticket in a "Details" window such as the...

...different types of tickets.

Alternately, to find a ticket, e.g., upon selection of the "Find" button 2453 from the tool bar 2450, the CSM **Transaction** , "Display Ticket Request **Transaction** " is invoked, where the ticket number is passed on the request for handling as described above.

It should be understood that, in the preferred embodiment, a "Change

Ticket Request **Transaction** " may be implemented allowing the customer to change some of the fields of a ticket that is already created. This restriction is enforced by the **GUI** as this CSM **transaction** does not impose any such conditions on the field being modified.

Remarks are comments added to a ticket for historical purposes and may aid in the resolution of the problem. A customer views the particular ticket's details that include the remarks desired. The "Display Remarks Response **Transaction** " is a response that shows all the comments added on the ticket either by the customer or by the enterprise. The CSM legacy system supports...display of the "Add Remarks" window (not shown) which allows the customer to add remarks to that Ticket. Thus, by implementing an "Add Remarks Request **Transaction** , " the customer may add remarks on a ticket that is in an open status at any time. This may be used as a final step, just after creating a ticket, for example, to enable the customer to describe the trouble in his/her own words or add any comments. This **transaction** returns a success or failure response.

Activities are events that occur to a ticket throughout its life cycle. These events include changing status, changing priority...

...of the person working the ticket. The customer must be viewing the particular ticket's details that contain the activities desired. The "Display Activity Response **Transaction** " is a response that provides all the activities, i.e., actions that have been taken on the ticket. Specifically, from the "Details" window 2490 (Figure...

...shown in the example screen display of Figure 16(k). From the activities window, the activities for that ticket are displayed.

This is a useful **transaction** in checking the status of a ticket and, it aids in tracking a ticket as it shows which organization the ticket is currently in.

The...

...ticket is to identify the Type of the problem which is basically the way CSM handles different problem types and is required for most CSM **transactions** . To do that the client front end asks the customer the problem/identifier type and then narrow down the problem by having the customer choose...

...fields is then gathered from the customer by presenting appropriate questions. once all the required information is available, the system performs an "Open Ticket Request **Transaction** " and passes all of the data fields. The CSM legacy system then attempts to open a Trouble Ticket based on the data passed, and performs an "Open Ticket Response **Transaction** " to indicate if the ticket was created successfully along with the ticket number.

Based on this response a confirmation message along with the ticket number...

...ticket out to an organization obtained from the user up front and stored

in the User Profile. This is done using an "Enter Activity Request **Transaction**" which allows the customer to enter different activities like 'Refer Out', 'Close', 'Refer Back' and 'Open' on a ticket by passing the appropriate activity code.

Finally, the Trouble Ticketing application allows the customer to close the ticket by using an "Enter Activity Request **Transaction**" described with respect to ticket creation. When a customer wishes to close a ticket, the system will make this **transaction** on behalf of the customer by passing the activity code for 'Close'. A customer is allowed to close a ticket only if it were created...

...satisfied with the problem resolution, that customer may refer the ticket back to the enterprise (MCI). This is also accomplished using the Enter Activity Request **Transaction**. Again, the system will make this **transaction** and pass the activity code for 'Refer Back'.

The creation of trouble tickets through Trouble Ticketing will now be described in greater detail in view...with the client presentation layer and interaction with the back-end systems. Information that is gathered via the presentation layer is used to construct backend **transactions**. The information returned from these backend **transactions** is formatted to DOM classes, which are forwarded to the presentation layer.

As shown in Figure 16(m), the TroubleTicket 2610 is the root of...is the same as the child Question's parentAnswer, the child Question is included in the group; otherwise, it is excluded from the group.

#### Online **invoicing**

Another application of the suite of data management applications is an online **invoicing** system, herein referred to as "ClientView," which provides customers with the ability to view **invoices** and reports online, and offers a facility for printing and faxing documents. The online **invoicing** system takes information available from different billing systems and incorporates that information into its database for subsequent retrieval and presentation to a user according to user-specified requests. A general block diagram illustrating the online **invoicing** system architecture 1300, integrated with the system of the present invention, is shown in Figure 17. Generally, as shown in Figure 17, the ClientView system 1300 is integrated within the system comprising: the user Web browser which employs a ClientView **GUI** 1130 for providing an interface to which a customer may request and view various billing **invoices** associated with the application services subscribed by the customer and provided by the system of the present invention via a secure socket connection for presentation of **invoice** reports. For example, using the **GUI** client application 20, customers may drill down on their applicable **invoices**, typically accessing them via the given customer identifiers such as the corp id, bill payer, SUBSTITUTE SHEET (RULE 26) or mega account numbers. The **invoice** reports may also be available for various application services. WRS client-side report viewer and requestor processes 200 which provide the support for generating and...

...applets having viewer classes that enable the downloading and display of reports generated from ClientView server processes 1350.

Also shown as part of the online **invoicing invoice** viewing system architecture 1300 of Figure 17 is the Web server/dispatcher component 1335 which provides for the transport between the Web browser and an online **invoicing** proxy interface 1140 including all secure communications and encryption. Thus, customer requests and server responses may be communicated from the user browser 1120 to the online **invoicing** server 1150 in a secure manner. Specifically, the dispatcher 1335 forwards user requests, such as "get index" message for retrieving a list of documents available for viewing by a customer, to the online **invoicing** server 1150 process that employs an integrated proxy application 1140 for receiving and interpreting the user messages and performing the online **invoicing** functionality. This proxy capability includes a multithreaded engine enabling multiple, simultaneously executing sessions supporting anticipated user load.

The interface between the dispatch server 1335 and the online **invoicing** server 1150 is also message-based, employing, e.g., TCP/IP socket transport, and, as will be described, a messaging protocol that is defined is employed in the other direction. That is the online **invoicing** proxy 1140 sends the generic header, followed by the proxy-specific response back to the dispatch server 1335 for communications over the firewall and back to the user browser 20.

The online **invoicing** proxy 1340 uses a "template proxy" as an implementation of the listener/slave portion of the proxy. The proxy 1340 passively listens on a previously...  
.:the parent proxy continues to listen for other request.

The forked process is generally dedicated to handling the detected requests. The forked process detects a **transaction** type from the proxy protocol header. The **transaction** types generally include synchronous, asynchronous, and bulk transfer, as described above.

The proxy 1340 then calls a "back-end" function whose function is dependent on the **transaction** type detected.

The back-end functions typically provide individual services for which the application is responsible.

For example, if the **transaction** type for a detected request is of "synch" type, the forked process executes the synch back-end function and passes the request as an argument. The synch back-end function generally passes the request to a CICS task on the online **invoicing** server and waits for a response. More specifically, the synch function first establishes a CICS task via a direct TCP/IP socket connection to the...

...count specified in the preamble block is piped from the CICS task, to the requesting process, and typically all the way back to the client **GUI** application. Upon completion of piping the data, the synch function

disconnects the CICS task and exits. The forked process which called the synch function also terminates itself by exiting.

In the preferred embodiment, the online

**invoicing** server 1350 stores documents from various billing systems and performs the various database queries and function calls in response to requests received from the customer via the online **invoicing** proxy 1340. Particularly, the online **invoicing** server 1350 is responsible for tasks including data collection, calculation, storage, and report generation. A more detailed description of the server 1350 is provided with reference to Figures 56 and 57.

During its operation, the online **invoicing** server 1350 supports communications with the OE server 39 which provides for authentication of users, supplying of entitlement information, and enabling order entry for the various online **invoicing** **invoice** SUBSTITUTE SHEET (RULE 26) viewing services order entry functions including functionality necessary to manage (create, update, delete) online **invoicing** users, and feed the appropriate order entry information to the online **invoicing** server 1350 in order to properly associate the appropriate online **invoicing** functionality and data to the right customer once given admission to the online **invoicing** **invoice** viewing service.

As described previously, order entry for the browser and all applications on the system of the present invention may be made through the OE order entry system. The online **invoicing** application service may be ordered for all **business** markets customers.

In the preferred embodiment, a messaging interface is utilized between the OE 39 and the online **invoicing** server 1350 for communications mechanism.

The online **invoicing** server 1350, typically functions as a client and receives authentication information, billing identifiers, and level of service information, which may also be supplied in response to the launch of the online **invoicing** GUI client application 1330. For example, when online **invoicing** client application 1330 is launched from the home page (Figure 5), a customer identifier such as the userid and the applicable corporate account numbers may be retrieved by the order entry system administration server, OE 39, and passed to the online **invoicing** server. The online **invoicing** server then makes the necessary association to individual bill payers that the user is authorized to view. The view of **invoices** may include a particular portion of the **invoice** as well as the entire **invoice** .

The online **invoicing** server 1350 also may interact with the inbox server component of the reporting system, WRS 270, by storing the news information regarding the online **invoicing** service, in SUBSTITUTE SHEET (RULE 26) addition to the event notifications, and report data from the application services.

In addition, the **invoice** files saved on the inbox may be retrieved and viewed using the report requestor 212 and the report viewer 215 components of WRS 200 (Figure 10) residing in the user browser 20.

Via the report requestor, the customer may request tailored reports regarding the **invoice** files and view or print the customized **invoice** reports displayed by the report viewer as described herein.

An application-level process flow 1360 for the ClientView system is now presented in view of Figure 18. After successful logon and entitlement determination (by OE server), and upon selection of the online **invoice** (ClientView) application from the downloaded home page to the user (Figure 5), a ClientView **applet** is invoked at step 1362 to display an online **invoice** screen at the customer workstation. As indicated at step 1364, the user then enters the customer identifiers on the online **invoice** screen which are then checked against the available list of customer identifiers in the online **invoice server** 's database at step 1368. If the customer identifier does not exist or is not a valid type at step 1370, the user is prompted to re-enter the identifier at step 1365. When the customer identifier is properly validated, the user is presented with the online **invoicing** products associated with the customer identifier at step 1372.

The user then may select products by their date ranges at step 1374 for viewing. At step 1376, a server module then retrieves a list of document based on the selected product and date range from the online **invoicing** database, and at step 1378, the list is presented to the user, from which the user may select to view a document, at step 1380. Upon the user SUBSTITUTE SHEET (RULE 26) selection, the server modules retrieve the document from the database at step 1382. At step 1384, the **invoice** and/or report documents are presented to the user at the user's workstation. At step 1386, the user may scroll through, or print the...

...step 1378.

The information stored in the database 1355 generally originate from different billing systems.

When data is available from these billing systems, the online **invoicing** server typically performs a conversion process and stores the converted data on tape until an audit approval. When the converted data is audited and approved, the data having the **invoicing** documents are stored to the database 1355. After the data has been stored in the database for a predetermined period, it may be moved from...

...and then migrated to an optical shelf where the data may be available for a certain period.

Having described generally, an overview of the online **invoicing** application service and its integration with the networkMCI Interact's network and data infrastructure, the specific functionalities of the online **invoicing** application, namely the online **invoicing** GUI application on the client platform side and the online **invoicing** server

in the enterprise Intranet, will now be described in detail below.

**online invoicing GUI** application

As in the other data management client

applications of the present invention, the **online invoicing** client application is implemented in Java to ensure platform independence and particularly is SUBSTITUTE SHEET (RULE 26) developed in accordance with many of the common objects, as described herein, for achieving interoperability with the application backplane. The client component of the **online invoicing** includes a client interface for the user to select what data to retrieve. The data is then retrieved through various application processing, and a list of **invoices** and reports are provided for the user to choose from for online viewing. When a customer clicks on the "online **invoice**" icon 95i on the home page (Figure 5), after a proper authentication via a logon, the customer is presented with a criteria screen 1900 as shown in Figure 19(a) from which the customer may specify various types of, and date ranges for, **invoices** desired. The criteria screen 1900 is divided into a customer identifier section 1183, products section 1193, and dates section 1195. The customer identifier type may include identification by corporate id 1191, account id, bill payer id, etc. Each **online invoicing** user is given at least one identifier type 1191 and a customer identifier number 1908 associated with the type at the time of order entry via the OE. The OE maintains this customer information and communicates the information to the **online invoicing GUI** application, when the application is invoked by the backplane applet. Accordingly, at the same time the **online invoicing GUI** application displays the criteria screen 1900, it also populates the identifier type 1191 and customer identifier 1908 fields automatically as received from the OE user authentication and entitlement system.

The user may then select a desired identifier type from the list of identifier types shown at 1191.

The **online invoicing GUI** application then automatically fills in the customer identifier field 1908 associated SUBSTITUTE SHEET (RULE 26) with the identifier type selected. In addition, if the customer...

...screen 1900, the corp id identifier type may be selected automatically. After selecting a desired identifier, the user typically then may execute the search of **invoices** available for that identifier by clicking on the retrieve button 1904, pressing an enter key, or using a fast key combination such as Alt+S.

The products and dates sections 1910, 1912 are used for displaying the service products for which **invoice** viewing is available for a given customer identifier type and the date range for the available **invoices**. When the user executes the search, the products field 1910 is filled in with the date ranges 1912, indicating available **invoice** reports for various period ranges. For retrieving **invoice** documents, the user may select ranges of dates including multiple ranges of dates as shown at 1195, and then click on the retrieve button 1904...

...fast key combination Alt+R, or click on any area within the date range

list box 1912.

Upon executing the retrieve user command, the online **invoicing GUI** application displays the screen 1915 shown at Figure 19(b) listing the report documents. For each document, date, **invoice** number, bill payer id, and number of pages are displayed as shown in screen display 1915. The status bar 1917 at the bottom of the...

...of indices (document lists) loaded. The number of indices which may be loaded at one time may be configurable by a customer via the online **invoicing GUI** application.

An **invoice** report listed then may be selected and retrieved by clicking on the retrieve button 1904, pressing an enter key or double clicking on a SUBSTITUTE...to enter in the desired page range for viewing. The mail/payment option 1922 for retrieving only the remittance pages without having to retrieve additional **invoice** pages, is available from this screen.

Figure 20 illustrates a sample **invoice** document 1925 retrieved when an **invoice** item is selected from a screen 1915 shown at Figure 19(b).

Using the menu bar 1927 or a tool bar 1928, a customer may...

...figures, such as minutes and charges, by highlighting the numbers directly on the screen.

The above-mentioned fax current document option offered by the online **invoicing** application includes an ability to fax to the customer, at a customer specified SUBSTITUTE SHEET (RULE 26) location, a current page, specified range of pages, or the entire document by making an appropriate selection in a fax dialog box.

#### Online **invoicing** server

As described above, the online **invoicing** provides on-line visibility to various documents. In presenting various documents online to a customer, the **GUI** client application communicates to a online **invoicing** server via the proxy for retrieving up-to date information which the server maintains. These documents are indexed and stored in the online **invoicing** 's database 1355 (Figure 17). The online **invoicing** server includes several processes for performing the indexing and storing of the documents.

Figure 21 illustrates a process flow 1400 of the online **invoicing** server 1350. The server may receive data from a number of data centers 1432.

Figure 21 shows three data center locations: location "All 1432a, location "B" 1432b, and location "C" 1432c, as illustrative examples. At each site, **invoice** data associated with various products is available from various billings systems associated with the products, as shown at 1434.

In a preferred embodiment, an online **invoicing** 's conversion process 1436 is used to convert documents at each of the data centers. The conversion process generally defines the key information necessary to...stats report for each conversion run. The FCDS file is the document which may eventually be incorporated into the online -99 SUBSTITUTE SHEET (RULE 26) **invoicing** database. At step 1438, the online **invoicing** conversion process reads in a PARM file and an **invoice** file. The PARM file includes document information such as the logical record length. The **invoice** file is read one line at a time and at step 1440, key information including page numbers and document dates is placed in a header...

...is received typically via the e-mail, which is sent by various groups responsible for auditing and approving the document files sent to the online **invoicing** . Once the audit approval e-mail is received, an online **invoicing** production manually enters the product/division date and the **invoice** count into the audit statistics database 1459, at step 1456. The store job is manually released at step 1458 by the online **invoicing** production control after audit approval is received.

The online **invoicing** includes a DB2 database subsystem residing in a NOR4 mainframe. The subsystem -100 SUBSTITUTE SHEET (RULE 26) further includes an object database and an index database. An online **invoicing** store process 1460 loads the compressed document to an online **invoicing** object database and an online **invoicing** index load process 1480 stores index pointers to each document in the index database. An audit check is executed to ensure that the correct number of documents are added to the online **invoicing** databases during the object load and index load processes.

More particularly, the store process loads the conversion stats record into the audit stats database at 1460, the loads the compressed documents into the online **invoicing** object database 1467, as indicated at step 1468. At step 1470, the store process 1460 then creates a store status report and loads the report...

...of time. Once the indexes are loaded into the database, the documents are available for viewing.

The following database tables are included in the online **invoicing** database: a product cross reference table which assigns the online **invoicing** product code to the product name; a CDSParm table which keeps the store precess run statistics to allow for a restart when necessary and which...

...the documents key information.

The information on documents for imaging and storing are typically received from the various networkMCI Interact's application services.

The online **invoicing** server application is typically written in COBOL II using CICS/DB2 and OAM.

The persons skilled in the art would appreciate that the server

application may also be implemented with any other compiler languages or software tools. The server SUBSTITUTE SHEET (RULE 26) application includes a startup **transaction** (EDUP), and a multipurpose **transaction**, EDS2. The EDUP **transaction** passes several DB2 tables such as a function table, a version control table, and the batch print request table. The EDUP **transaction** also calls OAM to verify OAM is active and to get ...storage records are built for version control and batch print pricing. The EDUP is generally executed at CICS startup time.

EDS2 is a multi-purpose **transaction** which is started when a request is received from a client **GUI** application. Its functions may include product and date listing, index retrieval such as shown at 1915 Figure 19(b), and batch print request storing. The **transaction** uses the common top-level function (EDOCSCO00) and links to a lower level function designed to perform a specific task, based on a specific function...

...results are passed back to the top-level function which checks return codes for possible error. The data result is then passed to the client **GUI** application via the proxy and the Web/dispatcher 1335 (Figure 17), and statistics are written to a VSAM file. EDS2 is also executed for document retrieval for retrieving **invoice** documents shown at 1925 Figure 20. It uses the common top-level function and links to lower level functions to perform the retrieval processing.

Figure...

...server processes for responding to the client requests. After a user 2002 properly logs on the system of the present invention and invokes the online **invoicing** application at step 2004, by selecting an appropriate icon on the home page (Figure 5), the online **invoicing** client **GUI** SUBSTITUTE SHEET (RULE 26) application, at step 2006, generally requests communications with a listener process running in the server as described above with reference to Figure 6.

Generally, the communications from the online **invoicing** server to the client workstation is performed by a set of calls to the TCP/IP address space. As an example, a listener process, EZACIC02...

...activated at CICS initiation, and constantly "listens" for activities. When a request is received from the client, the listener, e.g., EZACIC02, invokes the EDS2 **transaction**, at step 2008. At step 2010, CICS invokes the first program, i.e., EDOCS000 in the example shown, in the **transaction** EDS2 via the CICS **transaction** control table. Then, at step 2012, EDOCS000 loads system tables into memory. In addition, EDOCS000 also makes calls to TCP/IP to communicate with the client **GUI** application. EDOCS000 is also responsible for logging both successful and unsuccessful requests, as well as routing the request to one of many sub programs, based...level results, produces error entries where needed, writes statistics, and passes any data retrieved (or an SUBSTITUTE SHEET (RULE 26) error) back to the client **GUI** application.

After each call to a subroutine, EDOCS000 checks a return code. EDOCS000 also checks return codes from calls to the TCP/IP and posts...

...as needed. When all the processing necessary for responding to the client is complete and response data is successfully sent to the client, the client **GUI** application sends an acknowledgment for the receipt of the data, back to the server. The socket is then closed, freeing it for another request to...

...associated with a customer identifier. This process gets all entries from the account/product cross-reference table for the customer identifier received from the client **GUI** application.

For each entry in the account/product cross-reference table found, the process looks up the product on the product cross-reference table. If...

...followed by dates sorted in descending order, for proper display at the client workstation. At step 2016, the sorted data is returned to the client **GUI** application for viewing by the user.

EDOCS000 links to EDOCS001 and executes it SUBSTITUTE SHEET (RULE 26) when a client **GUI** application requests index retrieval for specified dates within specified products.

EDOCS000 passes in the customer identifier, the product and a list of dates received from the client **GUI** application as entered in the criteria screen 1900 at Figure 19(a). At step 2018, EDOCS0001 reads the index table and extracts from the online **invoicing** database all matching entries and sorts them in order of date and **invoice** numbers. Different sorting order may be utilized for different products. The entries meeting the product/date criteria are then sent back to the client **GUI** application for presentation to a customer at step 2020. The matching entry message, which is sent to the client **GUI** application includes a subset of entry records found.

EDOCS000 links to EDOCS020/EDOCS040 and executes either one when a client **GUI** application requests for document retrieval such as the **invoice** document 1925 shown at Figure 20. EDOCS020 and EDOCS040 are ...document meeting the requested page range into the allocated storage as shown at step 2022. The retrieved document is then sent back to the client **GUI** application for presentation to the customer.

At step 2024, EDOCS220 and EDOCS440 are used for object searches on the document requested. These processes perform similar...

...pages in the SUBSTITUTE SHEET (RULE 26) requested range for the requested document. At step 2026, the retrieved document is sent back to the client **GUI** application and is displayed on the user's workstation.

For servicing batch-printing requests, EDOCS000 may link to EDOCS050 and execute it. A next available...

...the EDBPRINT table layout, and a new row is inserted into DB2. Errors from EDOCS050 are sent to EDOCS000, which reports them to the client **GUI**

application.

#### Communications Security

Communications security, which relates to the authenticity of the enterprise Web servers 24 (Figure 2) and the security of the transmitted data...actual identified sender. one technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction** . This technique employs SSL public-key cryptography with one-way hashing functions.

-108 SUBSTITUTE SHEET (RULE 26) Another communications issue involving the secure communications link...the Secure Web Server(s) 24 to access the underlying message; a DMZ Web header 174 which is used to generate a cookie 181 and **transaction** -111 SUBSTITUTE SHEET (RULE 26) type identifier 186 for managing the client/server session; a dispatcher header 175 which includes the target proxy identifier 180 associated with the particular type of **transaction** requested; proxy specific data 185 including the application specific metadata utilized by the target proxy to form the particular messages for the particular middle tier... disclaimer acknowledgment 221 on the logon page 220. If the entered userid and password are not valid or if there were too many unsuccessful logon **transactions** , the logon object 220 communicates the appropriate message to the customer 20 as shown at 221. A logon object 220, typically an **applet** launched in the logon Web page, connects to the Web **server** 24, for communicating a logon request to the system as shown at 222. The logon data, having an encrypted userid and password, is sent to...

...dispatcher 26 then decrypts the logon data and sends the data to the OE 39 after establishing a connection as shown at 26. The OE **server** 39 validates the userid and password and sends the results back to the dispatcher 26 as illustrated at SUBSTITUTE SHEET (RULE 26) 226 together with...and sends the entitlement string back to the backplane running on the client platform 10.

Furthermore, the cookie jar 28 is used to manage heartbeat **transactions** . Heartbeat **transactions** , as described above, are used to determine session continuity and to identify those processes which have died abnormally as a result of a process failure, system crash or a communications failure, for example.

During a customer session initialization, the cookie jar 28 generates a session id and sets up "heartbeat" **transactions** for the customer's session. Subsequently, a heartbeat request is typically sent from a process running on a client platform to the Web server 24...24 then sends the status back to the client platform process, also as shown at 230.

When a customer wants to logoff, a logoff request **transaction** may be sent to the Web server 24.

The Web server 24 then connects to the cookie jar 28 and requests logoff for the session....

...deleting the cookie, the cookie jar 28 sends a logoff status to the Web

server 24, which returns the status to the client platform.

Other **transaction** requests are also sent via the Web server 24 and the cookie jar 28 as shown in SUBSTITUTE SHEET (RULE 26) Figure 25. Figure 25 is a data flow diagram for various **transactions** communicated in the system of the present invention. Typically, when a customer enters a mouse click on an application link as shown at 231, an appropriate **transaction** request stream is sent to the Web server as shown at 232. The Web server 24 typically decrypts the **transaction** stream and connects to the cookie jar 28 to check if a given session is still valid as shown at 234. The cookie jar 28...

...the Web server 24 as shown at 234. The Web server 24 on receipt of valid session connects to the dispatcher 26 and sends the **transaction** request as shown at 236. When the dispatcher 26 obtains the request, it may also connect to the cookie jar 28 to validate the session...

...The dispatcher 26, upon receiving the valid session connects to a targeted application server or proxy 237, which may include OE, and sends the request **transaction** to the target as shown at 235. The server or proxy 237 processes the request and sends back the response as stream of data which...

...the backplane and the applications may send messages and requests to back-end services. The client communications unit includes a client session unit and a **transactions** unit. The client session unit and the **transactions** unit comprise classes used by client SUBSTITUTE SHEET (RULE 26) applications to create objects that handle ...the overall process. In the preferred embodiment, a single cookie typically suffices for the entire session. Alternatively, a new cookie may be generated on each **transaction** for added security.

Moreover, the cookie jar may be shared between the multiple physical servers in case of a failure of one server. This mechanism...1 minutes to the Web server to "renew" SUBSTITUTE SHEET (RULE 26) the session key (or record). The Web server in turn makes a heartbeat **transaction** request to the cookie jar. Upon receipt of the request, the cookie jar service "marks" the session record with a timestamp indicating the most recent...  
...delta is greater than a predetermined amount of time, the cookie jar service clears the session record, effectively making a session key dead. Any subsequent **transactions** received with a dead session key, i.e., nonexistent in the cookie jar, are forbidden access through the Firewall.

The heartbeat messages are typically enabled...26) prevent potentially hostile customer attacks; and, 3) the enterprise Intranet Mid-range Servers 30 and Legacy Mainframe Systems 40 which comprise the back end **business** logic applications.

As illustrated in Figure 26, the present invention includes a double or complex firewall system that creates a "demilitarized zone" (DMZ) between two...indicates the message type/mechanism 145 which may be one of four values indicating one of the following four message mechanisms and types:

- 1) Synchronous **transaction** , e.g., a binary 0; 2) Asynchronous request,

e.g., a binary 1; 3) Asynchronous poll/reply, e.g., a binary 2; 4) bulk transfer...

...indicates the status is unused in the request header but is used in the response header to indicate the success or failure of the requested **transaction**. More complete error data will be included in the specific error message returned. The status field 147 is included to maintain consistency between requests and...get the request serviced. The application proxy supports application specific translation and communication with the back-end application server for both the Web Server (java **applet** originated) messages and **application server** messages.

For example, in performing the verification, translation and communication functions, the Report Manager server, the Report Scheduler server and Inbox server proxies each employ...

...contains the data to store.

After a message is received, the parser object is created in the RMDispatcher.c object which is file containing the **business** logic for handling metadata messages at the back-end. It uses the services of an RMParse class. Upon determining that the client has sent a...

#### Claim

... by the customer; 18 one or more secure servers located between 19 the customer workstation and the enterprise for providing a secure transportation of data **transactions** 21 between the user interface and the one or more secure 22 servers, the one or more secure servers further 23 forwarding the data **transactions** for processing at the 24 enterprise; at least one dispatch server located at the 26 enterprise for receiving the data **transactions** from the 27 one or more secure servers through a firewall, the 28 dispatch server further verifying the customer's access 29 to the system and determining one of the data management services in the enterprise to which the data 31 **transactions** need be routed for processing; and SUBSTITUTE SHEET (RULE 26) 1 one or more application servers providing the 2 one or more data management services offered by the 3 enterprise, the one or more application servers 4 receiving the data **transactions** from the dispatch server for processing and forwarding response 6 **transactions** back to the one or more client 7 applications for presentation to the customer via the 8 dispatch server and the one or more secure...1 6. The integrated data management system as

2 claimed in claim 4, wherein the user interface includes 3 a Web-based graphical user interface ( **GUI** ) having a 4 backplane object downloaded with and launched by the Web-based **GUI** , the backplane object capable of 6 launching the one or more client applications upon 7 initiation by the customer according to the customer's 8...

...claimed in claim 6, wherein the user interface further 17 includes a logon object downloaded and launched by the 18 user interface for accepting logon **transactions** from 19 the customer, the logon object

creating a session object for communicating with the order entry server to 21 provide the customer authentication, 22 wherein upon successful customer validation, SUBSTITUTE SHEET (RULE 26) 1 the user interface downloids the one or more client 2 applications and the Web-based GUI having the backplane 3 object.

1 8. The integrated data management system as

2 claimed in claim 6, further comprising:

3 a user object for...

...s 6 entitlements to the Web enabled data management 7 services, 8 wherein the backplane uses the entitlements 9 to present, via the Web-based GUI , only those Web enabled services to which the user has privilege.

1 9. The integrated data management system as

2 claimed in claim 8, wherein...time.

1 23. The integrated data management system as

2 claimed in claim 2, wherein the one or more data 3 management services include an **invoice** viewing system 4 for enabling the customer to retrieve an **invoice** , over the public Internet, which relates to the one or more 6 data management services provided by the enterprise, 7 the one or more client applications further 8 including an **invoice** presentation application for 9 enabling selection and presentation of **invoice** documents in accordance with the customer entitlement, 11 the **invoice** presentation application further generating 12 an **invoice** request message in response to customer SUBSTITUTE SHEET (RULE 26) I selection of a specific **invoice** option and forwarding 2 the **invoice** request message via the one or more secure 3 servers, and 4 the one or more application servers further include an **invoice** server for maintaining a database of 6 image files associated with documents from the 7 application services and receiving the **invoice** request 8 message, the **invoice** server accessing the database in 9 response to a request message and generating a response message for forwarding back to the **invoice** presentation 11 application via the one or more secure servers, 12 wherein the response message is assembled in 13 a form suitable for display and the **invoice** 14 presentation application presents a customer selected **invoice** document at the customer workstation.

1 24. The integrated data management system as

2 claimed in claim 23, wherein the database of image 3 files further includes an object database, the **invoice** 4 server further comprising:

a conversion device for imaging documents by 6 defining key information necessary to retrieve 7 documents from the data management application...

...integrated data management system 2 as claimed in claim 23, wherein the

database of image 3 files further includes an index database, and the 4 **invoice** server further includes an index load device for storing index pointers pointing to the compressed 6 documents.

-139 SUBSTITUTE SHEET (RULE 26) 1 26. The...comprising the steps of: 9 managing one or more secure client sessions over the public Internet between the client browser and 11 at least one **secure server** ; 12 downloading and presenting Web-based **GUI** from 13 the **secure server** for initiating one or more client 14 applications which provide user interfaces to the one or more reporting and management applications according 16 to pre...

...applications and providing 3 responses from one or more remote application servers, 4 communicating the responses to the one or more client applications via the **secure server** for 6 presentation to the customer at the customer 7 workstation, 8 whereby the customer is enabled to command 9 and control the one or...

...1 34. The method as claimed in claim 33, 2 wherein the method further includes:

3 encrypting communications between the client 4 browser and the **secure server** ; identifying and validating the customer; and 6 linking the session with the customer.

1 35. The method as claimed in claim 33, 2 wherein the...9 server.

1 36. The method as claimed in claim 35, 2 further comprising the step of:

3 exchanging digital certificates to  
4 authenticate the **secure server** to the client browser.

-142 SUBSTITUTE SHEET (RULE 26) 1 37. The method as claimed in claim 35, 2 wherein the method further comprises:

3 downloading a backplane object with the Web 4 based **GUI** ; and launching the backplane object which 6 initiates the one or more client applications upon a 7 selection by the customer, the backplane object further...

...the steps of:

3 downloading a logon object prior to the step 4 of downloading the backplane object, the logon object for receiving a logon **transaction** from the customer and 6 transmitting the logon **transaction** to an order entry 7 server to authenticate the customer for access into the 8 system, 9 wherein upon a successful customer validation, the logon object sends a command to the one 11 or more secure servers to download the Web-based **GUI** 12 having the backplane object.

1 39. The method as claimed in claim 38, 2 wherein the method further includes:

3 enabling the customer to...

...to the one or more reporting and data 7 management applications, 8 wherein the backplane uses the entitlements 9 to present via the Web-based **GUI** , only those Web enabled services to which the current customer has 11 privilege.

1 41. The method as claimed in claim 40, 2 further comprising from the **secure server** to the customer workstation for presenting one or more customer 6 selectable data reporting items for the customer in 7 accordance with the customer entitlements...

...report 3 manager:

4 maintaining an inventory of reports associated with the customer;

6 receiving a customer report request message 7 via the Web-based **GUI** ; 8 accessing report items according to the 9 report request message; and generating a response message including a 11 metadata description of reporting items to...

...description of the report data, downloading the report data and the metadata 11 associated with the report data to the customer 12 workstation via the **secure server** for generation of 13 reports according to the metadata description, and for 14 presentation of the generated reports to the customer via the Web-based **GUI** .

1 48. The method as claimed in claim 47, the 2 method further comprising:

3 launching an inbox client **application** by the 4 backplane; retrieving customer-specific notification 6 data which are stored in the centralized inbox **server** ; 7 presenting the customer-specific notification 8 data to the customer via the Web-based **GUI** .

1 49. The method as claimed in claim 48, the 2 method further comprising:

3 launching the one or more reporting and 4 management applications... method further comprising:

3 detecting with a first polling thread of the 4 inbox client application an incoming message from the inbox server via the **secure server** ; 6 starting a second thread upon detection of 7 the incoming message; 8 listening with the second thread for new 9 messages; and receiving the...

...at the pre-determined time.

1 55. The method as claimed in claim 47, 2 wherein the method further includes:

3 creating one or more **invoice** documents 4 relating to the services and products offered by the enterprise; 6 downloading the one or more client 7 applications from the **secure server** for enabling 8 selection and presentation of **invoice** documents in 9 accordance with the customer entitlements; generating an **invoice** request message in 11 response to

customer selection of a specific **invoice** 12 option and forwarding the **invoice** request message via 13 the **secure server** to an **invoice** server; and 14 maintaining a database of image files associated with the **invoice** documents; 16 accessing the database in response to the 17 **invoice** request message and generating a response 18 message for forwarding to the customer workstation via 19 the **secure server** ; and assembling the response message to include a 21 customer selected **invoice** document in a form suitable 22 for presentation via the Web-based **GUI** .

SUBSTITUTE SHEET (RULE 26)

1 56. The method as claimed in claim 55, 2 wherein the method further comprises:

3 imaging documents by defining key ...59. The method as claimed in claim 58, 2 wherein the step of generating the cookie is performed 3 on a separate server from the **secure server** during an 4 entitlements communications, after identification and authentication of the customer.

1 60. The method as claimed in claim 59, 2 further including:

3...

...platforms.

1 62. The method as claimed in claim 61, the 2 method further including:

3 encrypting transmissions of all customer data 4 between the **secure server** and the dispatch server; and SSL encrypting transmissions of all customer 6 data between the secure servers and the client browser.

1 63. The method...

5/3,K/17 (Item 1 from file: 654)

DIALOG(R)File 654:US Pat.Full.

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03089241

Utility

INTEGRATED INTERFACE FOR WEB BASED CUSTOMER CARE AND TROUBLE MANAGEMENT

PATENT NO.: 6,032,184

ISSUED: February 29, 2000 (20000229)

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APPL. NO.: 9-159,701  
FILED: September 24, 1998 (19980924)

#### CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Ser. No. 08-581,728 filed Dec. 29, 1995, now abandoned entitled DIRECT DISPATCH, and claims the benefit of U.S. Provisional patent application U.S. Ser. No. 60-060,655, filed Sep. 26, 1997, entitled INTEGRATED CUSTOMER INTERFACE SYSTEM FOR COMMUNICATIONS MANAGEMENT.

FULL TEXT: 1141 lines

#### FIELD OF THE INVENTION

The present invention relates generally to an Internet enabled communications **network management** tool, and more specifically is directed toward a system and method for interactive trouble reporting and monitoring.

#### BACKGROUND OF THE INVENTION

To insure a high availability rate in communications network services provided to customers, service providers require accurate and responsive maintenance efforts. The **network management** services that support these maintenance efforts are a vital part of a service provider's marketability.

In conventional customer enabled maintenance systems, a connection is... for identifying the status of current and future repair efforts.

Customers also desire access to this information. Generally, a customer's assessment of a particular **network management** service is not based solely upon the time frame of repair for the current network failure. In other words, the customer does not want to the part of customers to access their data over the Internet.

The present invention is one component of an integrated suite of customer **network management** and report applications using the Internet and a World Wide Web ("WWW" or "Web") browser paradigm. Introduced to the communications industry as "networkMCI Interact" the...s remote customer workstation, a user first logs on to the Internet through any Internet access route, and then logs on to the enterprise Web- **server** . After verification of the customer's entitlements to use the system, the Web- **server** downloads an available suite of services for that customer, which may include the trouble ticket tool, which is offered by the assignee of the present...

... displays of data to the customer. From the opening screen, the customer may select the opportunity to open a new trouble ticket, and the Web- **server** will then download the service **program** object which will enable opening and generation of a trouble ticket.

At the time of customer verification, the enterprise Customer Service Management System ("CSM") has obtained certain information relating to a customer profile maintained on an administrative **server** that provides authentication services for the present invention. This customer profile information may automatically prepopulate at least one field in a dialog ... by prepopulation allows the service organization to begin the trouble resolution process with minimal delay.

Upon downloading of the prepopulated trouble report from the Web- **server**, the customer then enters information into a problem classification dialog. The problem classification dialog describes the type of network problem, failure, or customer inquiry (e...).

...of these components can be found in a series of related, co-pending U.S. patent applications summarized in INTEGRATED CUSTOMER INTERFACE SYSTEM FOR COMMUNICATIONS **NETWORK MANAGEMENT**, (Attorney Docket 11038), filed on even date, the disclosure and contents of which are incorporated herein by reference thereto.

FIG. 1 is a diagrammatic illustration 10 and provides customer access to the enterprise system, having one or more **downloadable application** objects 11 directed to front end **business** logic and application services, one or more backplane services objects 12 for managing sessions, one or more presentation services objects 13 for the presentation of...

... options and data to the customer and for Internet communications over the public Internet.

A second or middle tier 16 is provided, having secure Web **servers** 24 and back end services to provide applications that establish user sessions, govern user authentication and their entitlements, and communicate with adaptor programs to simplify...

... back end or third tier 18 having applications directed to legacy back end services includes database storage and retrieval systems and one or more database **servers** for accessing system resources from one or more legacy systems 20.

Generally, as explained in co-pending U.S. patent application GRAPHICAL USER INTERFACE FOR...workstation 10 is client software capable of providing a platform-independent, browser-based, consistent user interface implementing objects programmed to provide a reusable and common **GUI** abstraction and problem-domain abstractions. More specifically, the client-tier software is created and distributed as a set of Java classes including the **applet** classes to provide an industrial strength, object-oriented environment over the Internet. Application-specific classes are designed to support the functionality and **server** interfaces for each application with the functionality delivered through the system being of two-types: 1) cross-product, for example, inbox and reporting functions, and...

... a diagrammatic illustration of the network and platform components of the networkMCI Interact system, including: the Customer workstation 10; the

Demilitarized Zone 17 (DMZ); Web **Servers** cluster 24; the MCI Intranet Dispatcher/Proxy **Servers** cluster 30; and the MCI Intranet Application **servers** 40, warehouses, legacy systems, etc.

The customer workstation 10 is browser enabled and includes client applications responsible for presentation and front-end services. Its functions include providing a user interface to various MCI services and supporting communications with MCI's Intranet Web **server** cluster 24.

As illustrated in FIG. 2(a), and more specifically described in the above-referenced co-pending U.S. patent application Ser. No. 09...

...applications generally are integrated using a "backplane" services layer 12 which provides a set of services to the application objects which provide the front end **business** logic 11 and manages their launch. The networkMCI Interact common set of objects provide a set of services to each of the applications such as: 1) session management; 2) application **launch**; 3) **inter-application** communications; 4) window navigation among applications; 5) log management; and 6) version management.

The primary common object services include: graphical user interface (**GUI**); communications; printing; user identity, authentication, and entitlements; data import and export; logging and statistics; error handling; and messaging services.

FIG. 2(a) is an diagrammatic...

... of a backplane architecture scheme illustrating the relationship among the common objects. In this example, the backplane services layer 12 is programmed as a Java **applet** which can be loaded and launched by the Web browser 14. With reference to FIG. 2(a), a typical user session starts with a Web...

... 2(a) as buttons 58a,b,c selectable by the user. As illustrated in FIG. 2(a), upon selection of an application, the backplane 12 **launches** that specific **application**, for example, Service Inquiry 54a or Alarm Monitor 54b, by creating the application object. In processing its functions, each application in turn, may utilize common...user interface objects 56a,b created and used by a respective application 54a,b for its own presentation purposes. FIG. 3 illustrates an example client **GUI** presented to the client/customer as a browser Web page 60 providing, for example, a suite 70 of **network management** reporting applications including: MCI Traffic Monitor application 72; an alarm monitor application 73; a Network Manager application 74 and the Service Inquiry application 75. Access...

...functionality to traditional e-mail communications.

Briefly, when the client application on the customer's workstation needs to communicate with one of the Intranet application **servers** 40 it will use an instance of one of the objects from a client communications package installed in the client platform. When the data is to be communicated, the objects will format the data, and particularly, encrypt it, for example, by using browser to Web **server** negotiated SSL. As shown in FIG. 4, the objects will then communicate the data by establishing a secure TCP messaging session with one of the DMZ networkMCI Interact Web **servers** 24

via an Internet secure communications path 22 established, preferably, in accordance with a secure sockets layer ("SSL") protocol, such as HTTPS. The DMZ networkMCI Interact Web **servers** 24 function to decrypt the client message, preferably via the SSL implementation, and unwrap the session key and verify the users session. After establishing that the request has come from a valid user and mapping the request to its associated session, the DMZ Web **servers** 24 will re-encrypt the request and forward it over a second secure socket connection 23 to the dispatch **server** 26 inside the enterprise Intranet.

As described in greater detail in the co-pending U.S. patent application AUTHENTICATION AND ENTITLEMENTS FOR USERS OF WEB...

... the disclosure of which is incorporated herein by reference thereto, a networkMCI Interact session is designated by a logon, successful authentication, followed by use of **server** resources, and logoff. As world-wide Web communications use HTTP, a stateless protocol, each HTTP request and reply is a separate TCP/IP connection, completely independent of all previous or future connections between the same **server** and client. Associating a given HTTP request with the logical session to which it belongs requires a "cookie jar **server**" 32 to generate a "cookie" which is a unique **server** -generated key that is sent to the client along with each reply to a HTTPS request. The client holds the cookie and returns it to the **server** as part of each subsequent HTTPS request. As desired, either the Web **servers** 24, the cookie **server** or the Dispatch **Server** 26, may maintain the "cookie jar" to map these keys to the associated session. A separate cookie jar **server** 32, as illustrated in FIG. 4 has been found desirable to minimize the load on the dispatch **server** 26. A new cookie will be generated when the response to the HTTPS request is sent to the client. This form of session management also functions as an authentication of each HTTPS request, adding security to the overall process.

As illustrated in FIG. 4, after one of the DMZ Web **servers** 24 decrypts and verifies the user session, it forwards the message through a firewall 25b over a TCP/IP connection 23 to the dispatch **server** 26 on a new TCP socket while the original socket 22 from the browser is blocking, waiting for a response. The dispatch **server** 26 will unwrap an outer protocol layer of the message from the DMZ services cluster 24, and forward the message to an appropriate application proxy...

... making sure that the user is entitled to communicate with the desired service. The user's entitlements in this regard are fetched by the dispatch **server** 26 from StarOE **server** 49 at logon time and cached.

If the requestor is authorized to communicate with the target service, the message is forwarded to the desired service's proxy. Each application proxy is an application specific daemon which resides on a specific Intranet **server**, shown in FIG. 4 as a suite of mid-range **servers** 40. Each Intranet application **server** of suite 40(a) is generally responsible for providing a specific back-end service requested by the client, and, is additionally capable of requesting services from other Intranet application **servers** by communicating to the specific proxy associated with that other

application **server** . Thus, an application **server** not only can offer its browser a client to **server** interface through the proxy, but also may offer all its services from its proxy to other application **servers** . In effect, the application **servers** requesting service are acting as clients to the application **servers** providing the service. Such mechanism increases the security of the overall system as well as reducing the number of interfaces.

The network architecture of FIG. 4 may also include a variety of application specific proxies having associated Intranet application **servers** including: a StarOE proxy for the StarOE application **server** 49 for handling authentication order entry/billing; an Inbox proxy for the Inbox application **server** 41, which functions as a container for completed reports, call detail data and marketing news messages, a Report Manager Proxy capable of communicating with a system-specific Report Manager **server** 42 for generating, managing and scheduling the transmission of customized reports including, for example: call usage analysis information provided from the StarODS **server** 43; network traffic analysis/monitor information provided from the Traffic view **server** 44; virtual data network alarms and performance reports provided by Broadband **server** 45; trouble tickets for switching, transmission and traffic faults provided by Service Inquiry **server** 46; and toll free routing information provided by Toll Free Network Manager **server** 47.

As partially shown in FIG. 4, it is understood that each Intranet **server** of suite 40 communicates with one or several consolidated network databases which include each customer's **network management** information and data. In the present invention the Services Inquiry **server** 46 includes communication with MCI's Customer Service Management legacy platform 20(a). Such **network management** and customer network data is additionally accessible by authorized MCI management personnel. As shown in FIG. 4, other legacy platforms 20(b), 20(c) and 20(d) may also communicate individually with the Intranet **servers** for servicing specific **transactions** initiated at the client browser. The illustrated legacy platforms 20(a)-(d) are illustrative only and it is understood other legacy platforms may be interpreted into the network architecture illustrated in FIG. 4 through an intermediate midrange **server** 40.

Each of the individual proxies may be maintained on the dispatch **server** 26, the related application **server** , or a separate proxy **server** situated between the dispatch **server** 26 and the midrange **server** 40. The relevant proxy waits for requests from an application client running on the customer's workstation 10 and then services the request, either by handling them internally or forwarding them to its associated Intranet application **server** 40. The proxies additionally receive appropriate responses back from an Intranet application **server** 40. Any data returned from the Intranet application **server** 40 is translated back to client format, and returned over the Internet to the client workstation 10 via the Dispatch **Server** 26 and at one of the Web **servers** in the DMZ Services cluster 24 and a secure sockets connection. When the resultant response header and trailing application specific data are sent back to...  
... middle tier software 16 includes a communications component offering

three (3) types of data transport mechanisms: 1) Synchronous; 2) Asynchronous; and 3) Bulk transfer. Synchronous **transaction** is used for situations in which data will be returned by the back-end **server** 40 quickly. Thus, a single TCP connection will be made and kept open until the full response has been retrieved.

Asynchronous **transaction** is supported generally for situations in which there may be a long delay in back-end **server** 40 response. Specifically, a proxy will accept a request from a customer or client 10 on an SSL connection and then respond to the client...network is divided into three major architectural divisions including: 1) the customer workstation 10 which includes those mechanisms enabling customer connection to the MCI Web **servers** located in the DMZ; 2) the Web **Servers** 24 in the DMZ 17 which is a secure network area set aside on the enterprise premises that is double firewalled at 25(a), 25...

... between both the public Internet and the enterprise Intranet to prevent potentially hostile customer attacks; and, 3) the MCI Intranet system 30 including the midrange **servers** 40 and legacy mainframe systems 20(a)-(d) (also illustrated at 20 in FIG. 1).

The networkMCI Interact customer access mechanisms may include public Internet access, with arrangements made through an Internet service provider.

The DMZ Web **servers** 24 are found in a special secure network area set aside from the Intranet to prevent potentially hostile customer access. All DMZ equipment is physically...

... Intranet. Similarly, the DMZ equipment is firewalled and obscured from hostile attacks from the public Internet, except for limited Web browser access to the Web **servers** which are located in the DMZ. The customer's Web browser connects to a Web **server** in the DMZ which in turn acts as a proxy to extract select information from midrange **servers** located in the company Intranet. A customer never directly connects to **servers** in the company, thus ensuring internal company system security and integrity.

The DMZ acts as a double firewall for company Intranet from the public Internet because the Web **servers** located in the DMZ never store or compute actual customer sensitive data. The Web **servers** only put the data into a form suitable for display by the customer's Web browser. Since the DMZ Web **servers** do not store customer data, there is a much smaller chance of any customer information being jeopardized in case of a security breach.

The Infrastructure...

... patent applications SECURE CUSTOMER INTERFACE FOR WEB BASED DATA MANAGEMENT, U.S. Ser. No. 09/159,514 filed Sep. 24, 1998 (Attorney Docket 11043) and SECURE SERVER ARCHITECTURE FOR WEB BASED DATA MANAGEMENT, U.S. Ser. No. 09/159,406 filed ...actual identified sender. One technique employed to combat repudiation includes use of an audit trail with electronically signed one-way message digests included with each **transaction**. This technique employs public-key cryptography with one-way

hashing functions.

To provide the areas of functionality described above, the client tier at workstation 10...program elements. A Domain Object Model is utilized and is generally illustrated in FIG. 2(b) at 33, and is logically de-coupled from the **GUI** of the client browser 14. When the client browser 14, resident on the client workstation 10, calls the Service Inquiry application in response to a...

...object 12 first invokes a COUser object to determine the entitlements of the client through a corresponding StarOE object 49(a) resident on the StarOE **server** 49, as client identification and authentication to the system was earlier determined at the time of Log-In. After a determination of entitlements, the client side of the application, CoApp object 54(a) is **downloaded** as a **Java** object as previously described with respect ... Alternately, a functionally similar program or script may be downloaded as a Windows CAB file at this time. The CoApp object 54(a) provides a **GUI** for the client browser, and communicates with the domain object 35, which may or may not be locally downloaded or resident or workstation 10. As...

... trouble tickets to which the customer is entitled from the CSM. Service Inquiry object persistency is maintained by heart beat communication between the cookie jar **server** 32 and the client browser 14 as indicated at 38.

FIG. 5 illustrates a flow chart of the process used to open a trouble ticket... customer detail dialog 500 includes customer contact information. The Reported By, Primary Contact, Secondary Contact, Customer Name, and GMT access time (representing the company's **business** hours) fields are prepopulated by using the information included in the customer profile pertaining to the user as stored in the sysA drive **server** 41.

The Ref In Ticket, Customer Group ID, Report Source and GMT Test Time fields are provided by the customer. Ref In ticket ...the set of service organizations that are assigned to resolve the network event.

Continuing in step 214, customer workstation 102 then enters into an electronic **transaction** with customer service management system 20 to open the trouble ticket. In this electronic **transaction** , customer workstation 10 submits the trouble ticket to customer service management system 20 over the public Internet using the networkMCI Interact system previously described. Next...

...correction are highlighted in red.

After the corrections have been made, create button 410 is selected once again and customer workstation 10 initiates another electronic **transaction** with customer service management system 20 to ...s access to trouble tickets is defined by the identification and authentication of the customer at the time of the login by the Order Entry **Server** . Partitioning of trouble tickets and entitlements within a particular customer may also be done for convenience of the customer. For example, intra-customer partitions may

... for a network event at a customer workstation over the Internet as claimed in claim 13, wherein said downloading step further includes the step of **downloading** an **application** object which creates a browser frame for display of said data.

15. The method of remotely generating a trouble ticket for a network event at... a network event at a customer workstation over the Internet as claimed in claim 10, wherein said downloading step occurs automatically from an enterprise Web **server** in response to a customer request.

19. The method of remotely generating a trouble ticket for a network event at a customer workstation over the Internet as claimed in claim 18, wherein said Web **server** downloads a plurality of common objects to a Web browser on said customer work station in response to a customer inquiry.

20. The method of...

... network event at a customer workstation over the Internet as claimed in claim 19 wherein one or more of said objects downloaded from said Web **server** enables a graphical display of data from one or more trouble tickets.

**5/3,K/18 (Item 2 from file: 654)**

DIALOG(R)File 654:US Pat.Full.

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02936057

Utility

SYSTEMS AND METHODS FOR SECURE TRANSACTION MANAGEMENT AND ELECTRONIC RIGHTS PROTECTION

PATENT NO.: 5,892,900

ISSUED: April 06, 1999 (19990406)

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FULL TEXT: 20922 lines

SYSTEMS AND METHODS FOR SECURE TRANSACTION MANAGEMENT AND ELECTRONIC RIGHTS PROTECTION

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## ABSTRACT

The present invention provides systems and methods for electronic commerce including secure **transaction** management and electronic rights protection. Electronic appliances such as computers employed in accordance with the present invention help to ensure that information is accessed and...

...disseminated information. Such a virtual distribution environment may be used to protect rights of various participants in electronic commerce and other electronic or electronic-facilitated **transactions**. Secure distributed and other operating system environments and architectures, employing, for example, secure semiconductor processing arrangements that may establish secure, protected environments at each node...

### ...OF THE INVENTION(S)

This invention generally relates to computer and/or electronic security.

More particularly, this invention relates to systems and techniques for secure **transaction** management. This invention also relates to computer-based and other electronic appliance-based technologies that help to ensure that information is accessed and/or otherwise...

...such use.

The invention also relates to systems and methods for protecting rights of various participants in electronic commerce and other electronic or electronically-facilitated **transactions** .

The invention also relates to secure chains of handling and control for both information content and information employed to regulate the use of such content...

... techniques that manage, including meter and/or limit and/or otherwise monitor use of electronically stored and/or disseminated information. The invention particularly relates to **transactions** , conduct and arrangements that make use of, including consequences of use of, such systems and/or techniques.

The invention also relates to distributed and other...based processors, that can be used to establish security at each node of a distributed system.

## BACKGROUND AND SUMMARY OF THE INVENTION(S)

Telecommunications, financial **transactions** , government processes, **business** operations, entertainment, and personal **business** productivity all now depend on electronic appliances. Millions of these electronic appliances have been electronically connected together. These interconnected electronic appliances comprise what is increasingly...to some of the problems addressed by the present invention, only the present invention provides commercially secure, effective solutions for configurable, general purpose electronic commerce **transaction**

/distribution control systems.

### Controlling Electronic Content

The present invention provides a new kind of "virtual distribution environment" (called "VDE" in this document) that secures, administers... all electronic community members. These members include content creators and distributors, financial service providers, end-users, and others. VDE is the first general purpose, configurable, **transaction** control/rights protection solution for users of computers, other electronic appliances, networks, and the information highway.

A fundamental problem for electronic content providers is extending their ability to control the use of proprietary information. Content providers often need to limit use to authorized activities and amounts. Participants in a **business** model involving, for example, provision of movies and advertising on optical discs may include actors, directors, script and other writers, musicians, studios, publishers, distributors, retailers...

... users. These participants need the ability to embody their range of agreements and requirements, including use limitations, into an "extended" agreement comprising an overall electronic **business** model. This extended agreement is represented by electronic content control information that can automatically enforce agreed upon rights and obligations. Under VDE, such an extended agreement may comprise an electronic contract involving all

**business** model participants. Such an agreement may alternatively, or in addition, be made up of electronic agreements between subsets of the **business** model participants. Through the use of VDE, electronic ...do not provide sophisticated auditing and control configuration capabilities. This means that current electronic currency tools lack the sophistication needed for many real-world financial **business** models. VDE provides means for anonymous currency and for "conditionally" anonymous currency, wherein currency related activities remain anonymous except under special circumstances.

### VDE Control Capabilities...

... information, providers of such information, and clearinghouses that gather usage information regarding, and bill for the use of, electronic information.

VDE provides comprehensive and configurable **transaction** management, metering and monitoring technology. It can change how electronic information products are protected, marketed, packaged, and distributed. When used, VDE should result in higher revenues for information providers and greater user satisfaction and value. Use of VDE will normally result in lower usage costs, decreased **transaction** costs, more efficient access to electronic information, re-usability of rights protection and other

**transaction** management implementations, greatly improved flexibility in the use of secured information, and greater standardization of tools and processes for electronic **transaction** management. VDE can be used to create an adaptable environment that fulfills the needs of electronic information owners, distributors, and users; financial clearinghouses; and

usage...

... a broad range of technologies. VDE combines these technologies in a way that creates a "distributed" electronic rights protection "environment." This environment secures and protects **transactions** and other processes important for rights protection. VDE, for example, provides the ability to prevent, or impede, interference with and/or observation of, important rights related **transactions** and processes. VDE, in its preferred embodiment, uses special purpose tamper resistant Secure Processing Units (SPUs) to help provide a high level of security for...

... to pay for use of products, for example, credit clearinghouses and banks; the rights to privacy of parties who use electronic content (such as consumers, **business** people, governments); and the privacy rights ... electronic information.

#### VDE Functional Properties

VDE is a cost-effective and efficient rights protection solution that provides a unified, consistent system for securing and managing **transaction** processing. VDE can:

- (a) audit and analyze the use of content,
- (b) ensure that content is used only in authorized ways, and
- (c) allow information... of different parties, and a number of different rights protection schemes, simultaneously;
- (e) is able to preserve the rights of parties through a series of **transactions** that may occur at different times and different locations;
- (f) is able to flexibly accommodate different ways of securely delivering information and reporting usage; and... of incompatibilities in content control, violation of rights, or the need to get, install, or learn a new content control system.

The VDE securely administers **transactions** that specify protection of rights. It can protect electronic rights including, for example:

- (a) the property rights of authors of electronic content,
- (b) the commercial...the eyes of many potential users. VDE allows content providers and distributors to create applications and distribution networks that reflect content providers' and users' preferred **business** models. It offers users a uniquely cost effective and feature rich system that supports the ways providers want to distribute information and the ways users... the preferred embodiment. This base software serves as a secure, flexible, general purpose foundation that can accommodate many different rights applications, that is, many different **business** models and their respective participant requirements.

A rights application under VDE is made up of special purpose pieces, each of which can correspond to one... currency, compensation and debit management.

For electronic commerce, a rights application, under the preferred embodiment of the present invention, can provide electronic enforcement of the **business** agreements between all participants. Since different groups of components can be put together for different applications, the present invention can provide electronic control information for...implement and

enforce common social and commercial ethics and practices. By providing a unified control system, the present invention supports a vast range of possible **transaction** related interests and concerns of individuals, communities, businesses, and governments. Due to its open design, VDE allows (normally under securely controlled circumstances) applications using technology... electronic catalog shopping, multimedia, training materials, E-mail and personal documents, object oriented libraries, software programming resources, and reference/record keeping information resources (such as **business**, medical, legal, scientific, governmental, and consumer databases).

Electronic rights protection provided by the present invention will also provide an important foundation for trusted and efficient enhancements for improving data security in organizations by providing "smart" **transaction** management features that can be far more effective than key and password based "go/no go" technology.

VDE normally employs an integration of cryptographic and...properties produced by persons and organizations, such as documents, e-mail, and proprietary database information.

VDE enables an electronic commerce marketplace that supports differing, competitive **business** partnerships, agreements, and evolving overall **business** models.

The features of VDE allow it to function as the first trusted electronic information control environment that can conform to, and support, the bulk of conventional electronic commerce and data security requirements. In particular, VDE enables the participants in a **business** value chain model to create an electronic version of traditional **business** agreement terms and conditions and further enables these participants to shape and evolve their electronic commerce models as they believe appropriate to their **business** requirements.

VDE offers an architecture that avoids reflecting specific distribution biases, administrative and control perspectives, and content types. Instead, VDE provides a broad-spectrum, fundamentally configurable and portable, electronic **transaction** control, distributing, usage, auditing, reporting, and payment operating environment. VDE is not limited to being an application or application specific toolset that covers ... interoperability of electronic appliances, interoperability of content containers, and efficient creation of electronic commerce applications and models through the use of a programmable, secure electronic **transactions** management foundation and reusable and extensible executable components. VDE can support a single electronic "world" within which most forms of electronic **transaction** activities can be managed.

To answer the developing needs of rights owners and content providers and to provide a system that can accommodate the requirements and agreements of all parties that may be involved in electronic **business** models (creators, distributors, administrators, users, credit providers, etc.), VDE supplies an efficient, largely transparent, low cost and sufficiently secure system (supporting both hardware/software and... credit management (including

electronic credit and/or currency receipt, disbursement, encumbering, and/or allocation) using such a "secure subsystem."

VDE provides a secure, distributed electronic **transaction** management system for controlling the distribution and/or other usage of electronically provided and/or stored information. VDE controls auditing and reporting of electronic content... appliances under control of VDE represent VDE 'nodes' that securely process and control; distributed electronic information and/or appliance usage, control information formulation, and related **transactions**. VDE can securely manage the integration of control information provided by two or more parties. As a result, VDE can construct an electronic agreement between...

... modify commercial relationships to accommodate the evolving needs of, and agreements among, themselves. VDE does not require electronic content providers and users to modify their **business** practices and personal preferences to conform to a metering and control application program that supports limited, largely fixed functionality. Furthermore, VDE permits participants to develop **business** models not feasible with non-electronic commerce, for example, involving detailed reporting of content usage information, large numbers of distinct **transactions** at hitherto infeasibly low price points, "pass-along" control information that is enforced without involvement or advance knowledge of the participants, etc.

The present invention allows content providers and users to formulate their **transaction** environment to accommodate:

- (1) desired content models, content control models, and content usage information pathways,
- (2) a complete range of electronic media and distribution means...

... with steps (1) through (5) can enable most "real world" electronic commerce and data security models, including models unique to the electronic world.

VDE's **transaction** management capabilities can enforce:

- (1) privacy rights of users related to information regarding their usage of electronic information and/or appliances,

(2) societal policy such as laws that protect rights of content users or require the collection of taxes derived from electronic **transaction** revenue, and

(3) the proprietary and/or other rights of parties related to ownership of, ... in an electronic form, that is the progressive creation of commercial relationships that form, over time, a network of interrelated agreements representing a value chain **business** model. This is achieved in part by enabling content control information to develop through the interaction of (negotiation between) securely created and independently submitted sets of content and/or appliance control information. Different sets of content and/or appliance control information can be submitted by different parties in an electronic **business** value chain enabled by the present invention. These parties create control information sets through the use of their respective VDE installations. Independently, securely deliverable, component... be extended as new control information is submitted by existing participants. With VDE, electronic commerce

participants are free to structure and restructure their electronic commerce **business** activities and relationships. As a result, the present invention allows a competitive electronic commerce marketplace to develop since the use of VDE enables different, widely varying **business** models using the same or shared content.

A significant facet of the present invention's ability to broadly support electronic commerce is its ability to securely, independently delivered control components allow electronic commerce participants to freely stipulate their **business** requirements and trade offs. As a result, much as with traditional, non-electronic commerce, the present invention allows electronic commerce (through a progressive stipulation of various control requirements by VDE participants) to evolve into forms of **business** that are the most efficient, competitive and useful.

VDE provides capabilities that rationalize the support of electronic commerce and electronic **transaction** management. This rationalization stems from the reusability of control structures and user interfaces for a wide variety of **transaction** management related activities. As a result, content usage control, data security, information auditing, and electronic financial activities, can be supported with tools that are reusable, convenient, consistent, and familiar. In addition, a rational approach--a

**transaction** /distribution control standard--allows all participants in VDE the same foundation set of hardware control and security, authoring, administration, and management tools to support widely varying types of information, **business** market model, and/or personal objectives.

Employing VDE as a general purpose electronic **transaction** /distribution control system allows users to maintain a single **transaction** management control arrangement on each of their computers, networks, communication nodes, and/or other electronic appliances. Such a general purpose system can serve the needs of many electronic **transaction** management applications without requiring distinct, different installations for different purposes. As a result, users of VDE can avoid the confusion and expense and other inefficiencies of different, limited purpose **transaction** control applications for each different content and/or **business** model. For example, VDE allows content creators to use the same VDE foundation control arrangement for both content authoring and for licensing content from other...

... controlling and auditing (and other administration of use) electronically stored and/or disseminated information. This includes, for example, commercially distributed content, electronic currency, electronic credit, **business** **transactions** (such as EDI), confidential communications, and the like. VDE can further be used to enable commercially provided electronic content to be made available to users... direct (constituent) and/or "extended" electronic agreements they entered into through the use of VDE can be enforced reliably. These agreements may have both "dynamic" **transaction** management related aspects, such as content usage control information enforced through budgeting, metering, and/or reporting of electronic information and/or appliance use, and/or ... pass to unauthorized parties electronic information derived from usage of content or systems, and/or agreeing to observe copyright laws. Not only

can electronically reported **transaction** related information be trusted under the present invention, but payment may be automated by the passing of payment tokens through a pathway of payment (which...secure VDE related hardware instances that are interconnected by secured information exchange (for example, telecommunication) processes and distributed database means. VDE further includes highly configurable **transaction** operating system technology, one or more associated libraries of load modules along with affiliated data, VDE related administration, data preparation, and analysis applications, as well...diverse computer platforms and operating systems, and said various portions may all be carried by a VDE container.

An objective of VDE is supporting a **transaction** /distribution control ... such a standard has many obstacles, given the security requirements and related hardware and communications issues, widely differing environments, information types, types of information usage, **business** and/or data security goals, varieties of participants, and properties of delivered information. A significant feature of VDE accommodates the many, varying distribution and other **transaction** variables by, in part, decomposing electronic commerce and data security functions into generalized capability modules executable within a secure hardware SPU and/or corresponding software... that meet both basic requirements and evolving needs of most commerce applications.

VDE's fundamental configurability will allow a broad range of competitive electronic commerce **business** models to flourish. It allows **business** models to be ...content control information handling.

Because of the breadth of issues resolved by the present invention, it can provide the emerging "electronic highway" with a single **transaction** /distribution control system that can, for a very broad range of commercial and data security models, ensure against unauthorized use of confidential and/or proprietary information and commercial electronic **transactions** . VDE's electronic **transaction** management mechanisms can enforce the electronic rights and agreements of all parties participating in widely varying **business** and data security models, and this can be efficiently achieved through a single VDE implementation within each VDE participant's electronic appliance. VDE supports widely varying **business** and/or data security models that can involve a broad range of participants at various "levels" of VDE content and/or content control information pathways...as one thicker disc. Data carrying locations on such discs may be, at least in part, opaque.

VDE supports a general purpose foundation for secure **transaction** management, including usage control, auditing, reporting, and/or payment. This general purpose foundation is called "VDE Functions" ("VDEFs"). VDE also supports a collection of "atomic...  
...more pieces of electronic content and/or it may be employed as a general component of the operating system capabilities of a VDE installation.

VDEF **transaction** control elements reflect and enact content specific and/or more- generalized administrative (for ...be able to use all and/or certain classes, of electronic content and/or VDE applications.

VDE ensures that certain prerequisites necessary for a given **transaction** to occur are met. This includes the secure execution of any required load modules and the availability of any required, associated data. For example, required... standard microprocessor, microcontroller and/or other digital processing components may materially reduce VDE related hardware costs by employing the same hardware resources for both the **transaction** management uses contemplated by the present invention and for other, host electronic appliance functions. This means that a VDE SPU can employ (share) circuitry elements... that serve as a foundation for a general purpose, sufficiently secure distributed electronic commerce solution. VDE enables an electronic commerce marketplace that supports divergent, competitive **business** partnerships, agreements, and evolving overall **business** models. For example, VDE includes features that:

"sufficiently" impede unauthorized and/or uncompensated use of electronic information and/or appliances through the use of secure communication, storage, and **transaction** management technologies. VDE supports a model wide, distributed security implementation which creates a single secure "virtual" **transaction** processing and information storage environment. VDE enables distributed VDE installations to securely store and communicate information and remotely control the execution processes and the character of use of electronic information at other VDE installations and in a wide variety of ways;

support low-cost, efficient, and effective security architectures for **transaction** control, auditing, reporting, and related communications and information storage. VDE may employ tagging related security techniques, the time-ageing of encryption keys, the compartmentalization of...

... communications and to provide the benefits of digital signature and authentication to securely bind together the nodes of a VDE arrangement, secure processing of important **transaction** management executable code, and a combining of a small amount of highly ...representing increments of logically related information.

VDE supports as many simultaneous predefined increment types as may be practical for a given type of content and **business** model.

securely store at a user's site potentially highly detailed information reflective of a user's usage of a variety of different content segment... ID, or any appropriate subset of the above).

provide a general purpose, secure, component based content control and distribution system that functions as a foundation **transaction** operating system environment that employs executable code pieces crafted for

**transaction** control and auditing. These code pieces can be reused to optimize efficiency in creation and operation of trusted, distributed

**transaction** management arrangements. VDE supports providing such executable code in the form of "atomic" load modules and associated data. Many such load modules are inherently configurable, aggregatable, portable, and extensible and singularly, or in combination (along with associated data), run as control methods under the VDE **transaction** operating environment. VDE can satisfy the requirements of widely differing electronic commerce and data security applications by, in part, employing this general purpose **transaction** management foundation to securely process VDE **transaction** related control methods. Control methods are created primarily through the use of one or more of said executable,

reusable load module code pieces (normally in...for the VDE arrangement who ensures secure interoperability and/or reliability (e.g., bug control resulting from interaction) between appliances and submitted control methods. The **transaction** management control functions of a VDE electronic appliance **transaction** operating environment interact with non-secure **transaction** management operating system functions to properly direct **transaction** processes and data related to electronic information security, usage control, auditing, and usage reporting. VDE provides the capability to manage resources related to secure VDE methods created under the present invention. To achieve this, VDE employs an Application Programmer's Interface (API) and/or a **transaction** operating system (such as a ROS) programming language with incorporated functions, both of which support the use of capabilities and can be used to efficiently...

... user interaction through: (a) "Pop-Up" applications which, for example, provide messages to users and enable users to take specific actions such as approving a **transaction**, (b) stand-alone VDE applications that provide administrative environments for user activities such as: end-user preference specifications for limiting the price per **transaction**, unit of time, and/or session, for accessing history information concerning previous

**transactions**, for reviewing financial information such as budgets, expenditures (e.g. detailed and/or summary) and usage analysis information, and (c) VDE aware applications which, as a result of the use of a VDE API and/or a **transaction** management (for example, ROS based) programming language embeds VDE "awareness" into commercial or internal software (application programs, games, etc.) so that VDE user control information... range of capabilities and configurations supported by the present invention, reducing the range of configuration opportunities to a manageable subset particularly appropriate for a given **business** model allows the full configurable power of the present invention to be easily employed by "typical" users who would be otherwise burdened with complex programming... subset of configuration activities whose general configuration environment (template) has been preset to reflect general requirements corresponding to that user, or a content or other **business** model can very substantially limit difficulties associated with content containerization (including placing initial control information on content), distribution, client administration, electronic agreement implementation, end-user...party that places content in its initial VDE container may have a variety of different, configurable templates depending on the type of content and/or **business** model related to the content. An end-user may have different configurable templates that can be applied to different document types (e-mail, secure internal...of VDE content handling participants.

support multiple simultaneous control models for the same content property and/or property portion. This allows, for example, for concurrent **business** activities which are dependent on electronic commercial product content distribution, such as acquiring detailed market survey information and/or supporting advertising, both of which can...causing the generation of a VDE content container whose content includes customer content usage information reflecting secure, trusted revenue summary information and/or detailed user

**transaction** listings (level of detail might depend, for example on type or size of **transaction** --information regarding a bank interest payment to a customer or a transfer of a large (e.g. over \$10,000) might be, by law,

automatically... multiple pathway branches for the flow of both VDE content control information and VDE managed content enables an electronic commerce marketplace which supports diverging, competitive **business** partnerships, agreements, and evolving overall **business** models which can employ the same content properties combined, for example, in differing collections of content representing differing at least in part competitive products.

enable... ranging from inexpensive consumer (for example, television set-top appliances) and professional devices (and hand-held PDAs) to servers, mainframes, communication switches, etc. The scalable **transaction** management/auditing ...include: (a) VDE system software to in part extend and/or modify host operating systems such that they possess VDE capabilities, such as enabling secure **transaction** processing and electronic information storage; (b) one or more application programs that in part represent tools associated with VDE operation; and/or (c) code to ...

...microprocessor(s), other CPU(s) or other digital processing logic.

employ audit reconciliation and usage pattern evaluation processes that assess, through certain, normally network based, **transaction** processing reconciliation and threshold checking activities, whether certain violations of security of a VDE arrangement have occurred. These processes are performed remote to VDE controlled... a family of authoring, administrative, reporting, payment, and billing tool user applications that comprise components of the present invention's trusted/secure, universe wide, distributed **transaction** control and administration system. These components support VDE related: object creation (including placing control information on content), secure object distribution and management (including distribution control... support both "translations" of VDE electronic agreements elements into modern language printed agreement elements (such as English language agreements) and translations of electronic rights protection/ **transaction** management modern language agreement elements to electronic VDE agreement elements. This feature requires maintaining a library of textual language that corresponds to VDE load modules... binding agreement), would review the generated document material upon completion and employ such additional textual information and/or editing as necessary to describe non electronic **transaction** elements of the agreement and make any other improvements that may be necessary. These features further support employing modern language tools that allow one or...that can be employed as secure credit, banking, and/or money cards. A feature of the present invention is the use of portable VDEs as **transaction** cards at retail and other establishments, wherein such cards can "dock" with an establishment terminal that has a VDE secure sub-system and/or ... a "trusted" financial clearinghouse (e.g., VISA, Mastercard). The VDE card and the terminal (and/or online connection) can securely exchange information related to a **transaction** , with credit and/or electronic currency being transferred to a merchant and/or clearinghouse and **transaction** information flowing back to the card. Such a card can be used for **transaction** activities of all sorts. A docking station, such as a PCMCIA connector on an electronic appliance, such as a personal computer, can receive a consumer's VDE card at home. Such a station/card combination can be used for on-line **transactions** -in the same manner as a VDE installation that is permanently installed in such an electronic appliance. The card can be used as an "electronic..."

... The card can act as a convergence point for financial activities of a consumer regarding many, if not all, merchant, banking, and on-line financial **transactions**, including supporting home banking activities. A consumer can receive his paycheck and/or investment earnings and/or "authentic" VDE content container secured ... A user can send digital currency to another party with a VDE arrangement, including giving away such currency. A VDE card can retain details of **transactions** in a highly secure and database organized fashion so that financially related information is both consolidated and very easily retrieved and/or analyzed. Because of...

... including use of effective encryption, authentication, digital signaturing, and secure database structures, the records contained within a VDE card arrangement may be accepted as valid **transaction** records for government and/or corporate recordkeeping requirements. In some embodiments of the present invention a VDE card may employ docking station and/or electronic or other device operatively attached thereto, and/or remotely, such as at a remote server site. A card's data, e.g. **transaction** history, can be backed up to an individual's personal computer or other electronic appliance and such an appliance may have an integrated VDE installation of its own. A current **transaction**, recent **transactions** (for redundancy), or all or other selected card data may be backed up to a remote backup repository, such a VDE compatible repository at a financial clearinghouse, during each or periodic docking for a financial **transaction** and/or information communication such as a user/merchant **transaction**. Backing up at least the current **transaction** during a connection with another party's VDE installation (for example a VDE installation that is also on a financial or general purpose electronic network), by posting **transaction** information to a remote clearinghouse and/or bank, can ensure that sufficient backup is conducted to enable complete reconstruction of VDE card internal information in... Certification data can also serve as information that contributes to determining the decommissioning or other change related to VDE sites.

support the separation of fundamental **transaction** control processes through the use of event (triggered) based method control mechanisms. These event methods trigger one or more other VDE methods (which are available to a secure VDE sub-system) and are used to carry out VDE managed **transaction** related processing. These triggered methods include independently (separably) and securely processable component billing management methods, budgeting management methods, metering management methods, and related auditing management... participants (by content creators, for example) to require a method which prohibits end-users from electronically saving decrypted content, a provider of credit for VDE **transactions** might require an audit method that records the time of an electronic purchase, and/or a user might require a method that summarizes usage information... and may support:

- (a) secure electronic distribution of information, for example commercial literary properties,
- (b) secure electronic information usage monitoring and reporting,
- (c) secure financial **transaction** capabilities related to both electronic information and/or appliance usage and other electronic credit and/or currency usage and administration capabilities,

- (d) privacy protection for...new content aggregations, and
- (5) multiple concurrent models.

### Secure Processing Units

An important part of VDE provided by the present invention is the core secure **transaction** control arrangement, herein called an SPU (or SPUs), that typically must be present in each user's computer, other electronic appliance, or network. SPUs provide...

... and a publishing house 214. Each of the people connected to information utility 200 may be called a "VDE participant" because they can participate in **transactions** occurring within the virtual distribution environment 100.

Almost any sort of **transaction** you can think of can be supported by virtual distribution environment 100. A few of many examples of **transactions** that can be supported by virtual distribution environment 100 include:

home banking and electronic payments;  
electronic legal contracts;  
distribution ...transferring physical "things" such as electronic storage media, the virtual distribution environment 100 facilitates a completely electronic "chain of handling and control."

### VDE Flexibility Supports **Transactions**

Information utility 200 flexibly supports many different kinds of information **transactions**. Different VDE participants may define and/or participate in different parts of a **transaction**. Information utility 200 may assist with delivering information about a **transaction**, or it may be one of the **transaction** participants.

For example, the video ...shows an example of what may be inside one example of information utility 200. Information utility participants 200a-200g could each be an independent organization/ **business**. There can be any number of each of participants 200a-200g. In this example, electronic "switch" 200a connects internal parts of information utility 200 to each other and to outside participants, and may also connect outside participants to one another.

Information utility 200 may include a "transaction processor" 200b that processes **transactions** (to transfer electronic funds, for example) based on requests from participants and/or report receiver 200e. It may also include a "usage analyst" 200c that...

### ...Distributing "Content" Using A "Chain of Handling and Control"

As explained above, virtual distribution environment 100 can be used to manage almost any sort of **transaction**. One type of important **transaction** that virtual distribution environment 100 may be used to manage is the distribution or... mechanisms that may establish interdependencies and relationships between the participants. "Rules and controls" are flexible, and permit "virtual distribution environment" 100 to support most

"traditional" **business transactions** . For example:

"Rules and controls" may specify which financial clearinghouse(s) 116 may process payments,

"Rules and controls" may specify which participant(s) receive what...user 112 may have a virtual "credit card" that extends credit (up to a certain limit) to pay for usage of any content. A "credit **transaction**" can take place at the user's site without requiring any "online" connection or further authorization. This invention can be used to help securely protect ... can be used based on, for example, the number of dollars available in a credit account. Budget process 408 records and reports financial and other **transaction** information associated with such limits.

Content may be supplied to the user once these processes have been successfully performed.

#### Containers and "Objects"

FIG. 5A shows... the use of prepayments, credits, real-time electronic debits from bank accounts and/or VDE node currency token deposit accounts). SPU 500 may perform other **transactions** related to such VDE objects 300.

#### SPU Physical Packaging and Security Barrier 502

As shown FIG. 6, in the preferred embodiment, an SPU 500 may...such as CD-ROM devices, set-top cable devices, game devices, and a wide variety of other electronic appliances that use, allow access to, perform **transactions** related to, or consume, distributed information.

#### SPU 500 Internal Architecture

FIG. 9 is a detailed diagram of the internal structure within an example of SPU... of the detailed complexities of, particular hardware implementations. In addition to these characteristics found in many or most operating systems, ROS 602 provides secure VDE **transaction** management and other advantageous features not found in other operating systems. The following is a non-exhaustive list of some of the advantageous features provided...

...or process oriented events  
simplifies task management  
simplifies inter-process communications

Services based  
allows simplified and transparent scalability  
simplifies multiprocessor support  
hides machine dependencies  
eases **network management** and support

Component Based Architecture  
processing based on independently deliverable secure components  
component model of processing control allows different sequential steps  
that are reconfigurable based ...protect against tampering  
integrates security considerations at the I/O level

provides on-the-fly decryption of information at release time  
enables a secure commercial **transaction network**  
flexible key **management** features

Scalable  
highly scalable across many different platforms  
supports concurrent processing in a multiprocessor environment  
supports multiple cooperating processors  
any number of host or security...an OS layer "on top of" traditional OS  
platforms  
can be seamlessly integrated with a host operating system to provide a  
common usage paradigm for **transaction** management and content access  
integration may take many forms: operating system layers for desktops  
(e.g., DOS, Windows, Macintosh); device drivers and operating system  
interfaces...operating system, potentially based on an existing operating  
system, to create a Rights Operating System 602 including:

- (1) Redesign the operating system based on VDE **transaction** management requirements;
- (2) Compile VDE API functions into an existing operating systems; and
- (3) Integrate a VDE Interpreter into an existing operating system.

The first...

... be most effectively applied when a new operating system is being designed, or if a significant upgrade to an existing operating system is planned. The **transaction** management and security requirements provided by the VDE functions could be added to the design requirements list for the design of a new operating system...

...For example, the engineers responsible for the design of the new version or instance of an operating system would include the requirements of VDE metering/ **transaction** management in addition to other requirements (if any) that they use to form their design approach, specifications, and actual implementations. This approach could lead to a "seamless" integration of VDE functions and capabilities by threading metering/ **transaction** management functionality throughout the system design and implementation.

The second approach would involve taking an existing set of API (Application Programmer Interface) functions, ...of "seamless" integration (although not quite as "seamless" as the first approach). The benefits of this approach include the possibility that the incorporation of metering/ **transaction** management functionality into the new version or instance of an operating system may be accomplished with lower cost (by making use of the existing code...).

... in an API, and also using the design implications of the API functional approach to influence the design of the elements into which the metering/ **transaction** management functionality is incorporated).

The third approach is distinct from the first two in that it does not incorporate VDE functionality associated with metering/ **transaction** management and data security directly into the operating system code, but instead adds a new generalized capability to the operating system for executing metering/ **transaction** management functionality. In this case, an interpreter including metering/ **transaction** management functions would be integrated with other operating system code in a "stand alone" mode. This interpreter might take scripts or other inputs to determine what metering/ **transaction** management functions should be performed, and in what order and under which circumstances or conditions they should be performed.

Instead of (or in addition to...that uses content creator structures to meter user activities; and structures created/owned by a financial provider to handle financial parts of a content distribution **transaction** (e.g., defining a credit budget that must be present in a control structure to establish creditworthiness, audit processes which must be performed by the ... It also provides an extremely high level of configurability. In fact, ROS 602 will accommodate an almost unlimited diversity of content types, content provider objectives, **transaction** types and client requirements. In addition, the ability to dynamically assemble independently deliverable components at execution time based on particular objects and users provides a... because it limits the amount of resources (memory and processor) required. When VDE is deployed on more capable electronic appliances 600 such as desktop computers, **servers** and at clearinghouses, the commercial database scheme may be more desirable because it provides high performance in environments where resources are not limited.

One difference... once). SPE 503 may support single tasking or multi-tasking in the preferred embodiment. For example, "high end" implementations of SPE 503 (e.g., in **server** devices) should preferably include multi-tasking with "preemptive scheduling." Desktop applications may be able to use a simpler SPE 503, although they may still require...

...claim 211,  
said printer further comprising means for locking said decryption programming in said printer memory.

215. A method of printing comprising the steps of:  
downloading a decryption program from a memory of an appliance to a memory of an attached printer,  
encrypting a file to be printed,  
downloading said encrypted file from said comprising the steps of:  
downloading a fingerprinting program from a memory of an appliance to a memory of an attached printer, said fingerprinting program including a fingerprinting key,  
downloading at least two fonts...  
?

**DS**

Set	Items	Description
S1	33453	(INVOIC? OR TRANSACTION? OR BUSINESS) AND (NETWORK (3W) MAN- AGEMENT)
S2	64	S1 AND (SECURE (W) SERVER)
S3	23	S2 AND (GUI OR (GRAPHIC (3W) INTEFACE)) AND (APPLET OR LAU- NCH? OR DOWNLOAD)
S4	27	S2 AND (GUI OR (GRAPHIC (3W) INTEFACE))
S5	18	S4 AND (((APPLET OR LAUNCH? OR DOWNLOAD?) (3W) (APPLICATION? OR PROGRAM? OR APPLET? OR JAVA OR CORBA)) (S) (SERVER?))
?		

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